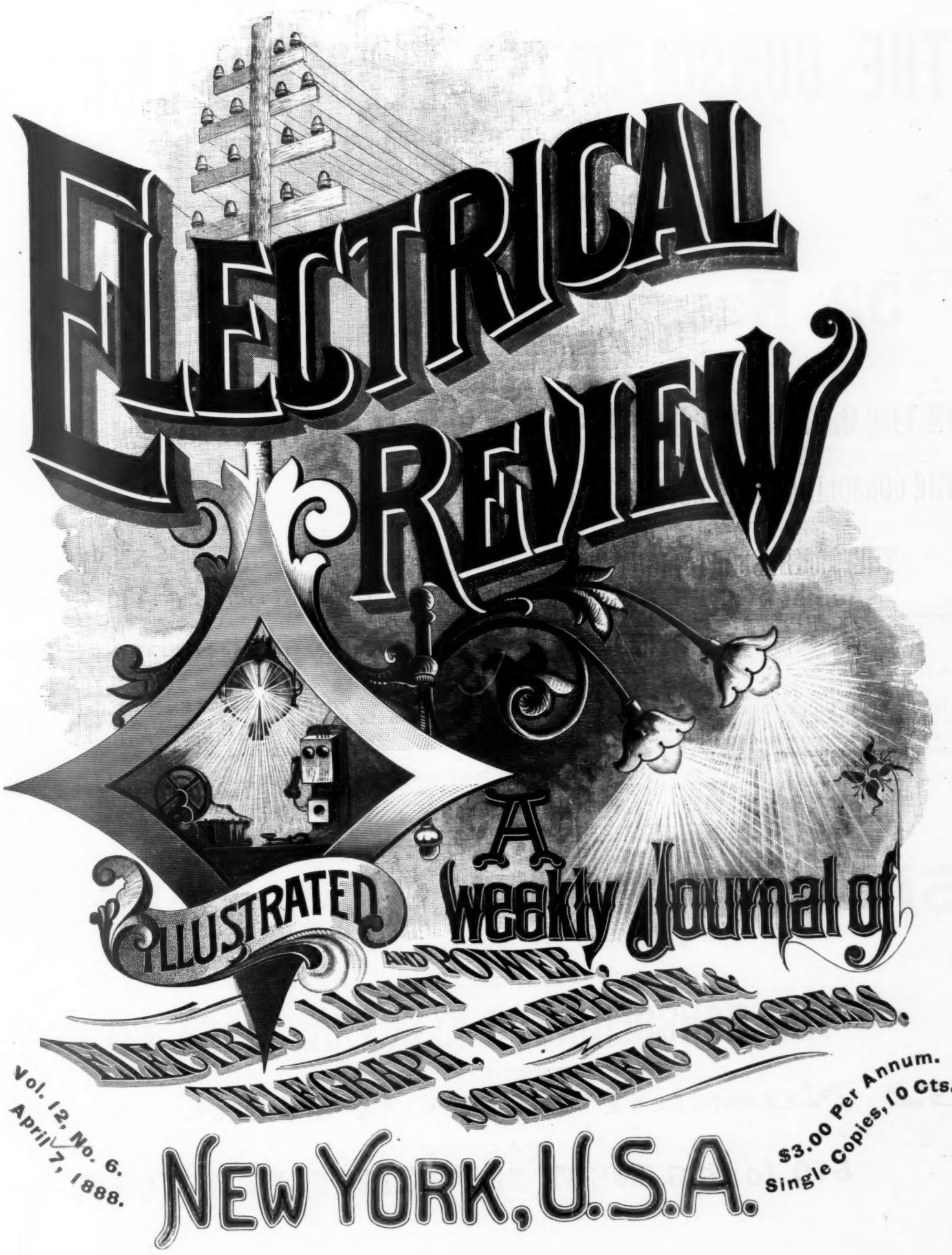
ELECTRICAL
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Weekly Journal of
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THE CONSOLIDATED ELECTRIC LIGHT CO.

GEORGE WESTINGHOUSE, Jr., President,

OWNERS OF THE

SAWYER-MAN PATENTS,

GENERAL OFFICE:

32 Nassau Street, New York.

(EXTRACT.)

IN THE U. S. CIRCUIT COURT FOR THE WESTERN DISTRICT OF PENNSYLVANIA.

THE CONSOLIDATED ELECTRIC LIGHT CO.,
vs.
THE McKEESPORT LIGHT CO.
[EDISON COMPANY.]

No. 5, May Term, 1888,
In Equity,
Suit on Patent No. 317,676.
FIBROUS CARBON FILAMENT.

ON DEMURRER TO BILL OF COMPLAINT.

ACHESON, J.

The precise question here presented was raised in the case of The Consolidated Electric Light Co. v. Edison Electric Light Co., 25 Fed. Rep. 719, and was decided adversely to the defendant. I have carefully read the opinion of Judge Wallace, and perceive no reason for doubting the correctness of his conclusion. How can it be said that the patent was issued without authority of law, and, therefore, is void, when, in fact, it was issued to the very person designated by Section 4,895? * * * * * * * * * * *

While this view saves the patent and subserves the justice of this case, it is neither counter to sound public policy nor tends to any evil consequences, so far as I can see.

And now, March 17th, 1888, the demurrer is overruled. * * * * * * * * * * *

SAWYER-MAN ELECTRIC CO.

HENRY C. DAVIS, President,

COMMERCIAL AGENTS OF

THE CONSOLIDATED ELECTRIC LIGHT CO.,

GENERAL OFFICE:

32 Nassau Street, New York.

FACTORY:

510 to 536 WEST 23d STREET, NEW YORK.

ELECTRICAL REVIEW

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Concerning a Rehearing of the Telephone Cases.

TO THE EDITOR OF ELECTRICAL REVIEW:

So many false and conflicting statements have been published in the newspapers in reference to a rehearing of the telephone cases, and the Government suit, I think it would be of interest to your readers to get the *facts*.

"The Supreme Court of the U. S. shall consist of a Chief Justice of the United States and eight associate justices, any six of whom shall constitute a quorum."—*Sec.* 673, *Revised Statutes of the U. S.*

Seven justices sat in the recent telephone cases. The court was a unit on all points except the Drawbaugh claim, three of the justices dissented from the majority *solely* on that point. Upon the question of fraud, upon which the Government suit mainly rests, the court *unanimously* say: "There is not the slightest evidence of fraud on the part of Bell or his attorneys in procuring the patent."

In regard to a rehearing, I enclose a copy of Rule 30 of the Rules of the Supreme Court, U. S. The italics are mine. You will see it is necessary that the petition for a rehearing be presented at the term at which judgment is entered, and will not be granted or argued unless a justice who concurred in the judgment *desires it*.

RULE 30.—"A petition for a rehearing after judgment can be presented only *at the term* at which judgment is entered, unless by special leave granted during the term; and must be printed and briefly and distinctly state its grounds, and be supported by certificate of counsel; and will not be granted, or permitted to be argued, *unless a justice who concurred in the judgment desires it*, and a majority of the court so determines."

The Government suit, brought at the instance and in the interest of the Pan Electric Telephone Co., is now before the Supreme Court on an appeal from the U. S. Circuit Court at Boston, who decided "that the Department of Justice has not the *power* to bring a suit to cancel a patent for fraud, there being no statute authorizing it since its repeal in 1836." The court below also decided that fraud was a proper defense to set up in any suit brought by a patentee for an infringement upon his patent. It may be four years before this case is argued. A motion made several months ago by the Solicitor-General to advance it on the docket has never been considered by the court. If the Supreme Court decides against the Bell Company on the question of power, the case goes back to the U. S. Circuit Court in Boston, to be tried upon its merits. The chief allegation fraud, and in fact all the allegations, have been settled by the recent decision.

M. I.

Washington, D. C., March 31.

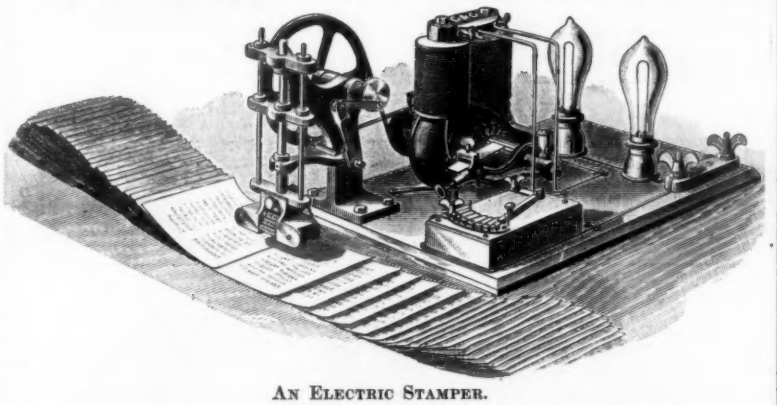
New York Electric Club.

Our esteemed contemporary, the London *Electrical Review*, says:

"How visiting Britishers' mouths must water when they find themselves the guests of the members of the Electric Club in New York! A mansion, elegantly fitted, lit by incandescent lamps; billiard rooms, parlors, lecture room, library, kitchen and restaurant, shoes blacked by electricity, an electrical stove, safe with electric lock, electric door opener, and so on, form the attractions and curiosities, and it is not surprising that the club is a favorite place of resort by the electrical talent, young and not so young, of New York and adjacent towns."

An Electric Stamper.

The very ingenious time-saver, shown herewith, is coming into popular favor wherever seen and tried. It was first adopted by Asst. Treas. Clark, of the American Express Company, of this city, who, in connection with the C. & C. Motor Company, worked out the device, until now it is one of the essential aids in the work of this great corporation. In stamping the innumerable vouchers received by the Express Company, the use of the electric stamp makes a decided saving, so much that one man can do the work of three. The operator has only to pass the vouchers, arranged as indicated in the illustration, rapidly beneath the stamp, which by means of electric power is in constant up and down motion. The stamp is



AN ELECTRIC STAMPER.

the regular hand stamp with changeable dates.

There will probably be a great demand for this excellent device in banking and post-office circles, where it will undoubtedly make a great saving in time and labor, besides turning out the work so much more rapidly.

Alleged Antiquity of the Telephone.

"The principle of the telephone has been known for 2,000 years in India," was the rather incredible statement made recently by Fred Amesbury, who has just returned to New York after a two years' sojourn in the land of striped tigers and wonderful fakirs. "I do not assert, mark you," continued Mr. Amesbury, "that they use the telephone as we use it, or that they have any system of general communication. What I do say is that the high caste people have a method of communicating with each other by vibratory action on a diaphragm, just as we do, but it is confined entirely to their temples, and its existence has remained a secret until within a very few years.

"I was in a town called Panj, about 200 miles from Madras, and while there became acquainted with an English officer named Harrington, who was a prime favorite with the natives because on one occasion he had saved a priest from drowning. He was a very genial, pleasant fellow, and had that peculiar magnetism about him that made and kept friends everywhere.

"It was through Harrington that I was enabled to learn the existence of telephonic communication and to satisfy myself of its antiquity.

"There are two temples in the village, about a mile apart. In the interior and on the ground floor of each is a small circular structure, which is guarded day and night from the natives as well as from strangers, and is supposed to be the abiding place of the 'governing spirit,' but in reality is the terminus of the telephonic line, which is laid underground from one building to the other.

"The superstitious natives regarded this little structure with the greatest awe and reverence, because they had seen demonstrated before their eyes—or rather ears—the power of this spirit to communicate with the other temple. They were required to make their offering in one building, and make known their wishes and desires. Then immediately repairing to the second temple they would be informed of all they had said and done, although neither priest had left his post. This was regarded as a demonstration of the power of the spirit.

"We were unable to determine the composition of the wire that connected the two buildings. It was some kind of metal, but neither steel, copper nor brass, although it closely resembled the latter. The transmitter was of wood and about the size of the head of a flour barrel, and to establish connection, instead of ringing a bell, the person wishing to attract attention at the other end stood close to the curious looking thing and shouted, 'Ooey! ooey! ooey!'

"This was answered by a similar shout, which, while faint, was distinct, and could be heard two feet away.

"After Harrington and I had gained the confidence of the priests—or, rather, after he had—we were given a carte blanche to do as we pleased, and we talked to each other from one temple to the other, for more than an hour, and were enabled to make an incomplete investigation.

"We learned that the telephone that we saw had been in use for thirty years. The priests were very old men, and they remembered that the line of communication had been renewed only once during their incumbency.

"They showed us the remains of worm-eaten transmitters and wooden conduits that must have been hundreds of years old. They claimed that the system had been in existence since the creation, and laughed at us when we told them that the same principle has only been applied in England and America within the last dozen years. In every part of India and in Burmah this system of secret communication exists, although hundreds of travelers have never suspected it. I believe that it dates back fully two thousand years."

The Effect of the Telephone Decision in Chicago and St. Louis.

Somebody must have been hit, when the telephone decision was promulgated, if one may judge by the flutter. Chicago, as is well known, is the headquarters of several of the injured parties, but the amount of whistling to keep up the courage of these is perfectly astonishing. In an interview the other day, the general counsel for one of these companies was asked:

"How will this decision affect your company?"

"It cannot affect us in any shape. We are operating under the Hopkins patent, which is for the broken-current system. I don't know much about patent law, but some of the best patent lawyers in this city say our patent cannot be broken by Bell or any one else."

"Then you propose to push ahead and build lines in this city?"

"Certainly. We are here to do business and we propose to remain."

"Will the Council grant you an ordinance?"

"I suppose it will, now that the Supreme Court has thus far brushed away all the other rivals of the Bell system."

"What do you think of the decision?"

"My opinion is that it will not stick without a rehearing. Four affirmative votes to three negative is not a majority of the court. It consists of nine judges and it takes five tc make a majority. Suppose that four of the judges of the Supreme Court should refuse to sit in a case for reasons personal to themselves and it should be tried by a bench of five only. Suppose, further, that the case was an intricate one, in which the public was as much interested as the private litigants, and that a decision was rendered by three of the five—a majority of a quorum if you please—is there any reason why the concerted opinion of one-third of the court should be accepted as a finality? I don't believe it will work."

Then comes the Cushman Company's general manager who says:

"We consider it favorable to our case, which is now pending in the United States Court before Judge Blodgett. The evidence is all in, and the case will be argued as soon as it can be reached."

"What are the points involved? Do they resemble the ones decided at Washington?"

"No. Our case rests on different grounds. We claim that Dr. S. D. Cushman discovered the process and art of sending articulate sounds by means of electricity in 1851, and put it in use. What Cushman discovered in 1851 includes all there is in the Bell patents of 1876-'77—the receiver. The transmitter, which has made the telephone valuable as a means of communication was not patented until two years after the Bell patent. Now if we prove this to be a fact the court will hold that Cushman by his laches dedicated his discovery to the public, and hence that part of the recent decision relating to Drawbaugh's failure to perfect his invention cannot apply to the Cushman case."

"Have you any telephones in operation?"

"Yes, in La Porte, Elkhart, and South Bend. We have closed contracts for Logansport and Lafayette, and will proceed at once to construct the lines."

"What has been done in relation to your ordinance pending before the Council?"

"The Committee on Fire and Water has recommended its passage, and as soon as it is granted we will begin soliciting subscribers."

Why should the Cushman people worry over the Supreme Court decision?

And another of these, on being spoken to on the subject, said:

"Oh! we are not in the ring. We are perfectly satisfied and our case is stronger than ever. You see the principle is different in our telephone. We can go right ahead, now, and the Bell folks will not dare to touch us."

The Drawbaugh Company, as well as half a dozen others, it is understood, will have the decision reversed at once, and a representative at the East is reported as saying: "It makes my blood boil with indignation, when I think of the manner in which our arguments and statements of fact are ignored."

Down in St. Louis, "Gentleman George" Durant seems to be after the Pan Company. The feeling of uneasiness resulting from the decision was not alleviated, when a day or so after, "The letter that they never looked for came," in the shape of a notice from the Bell Company's attorneys, demanding a change of instruments, and the substitution for those heretofore used by Bell instruments, with the usual "hereof fail not at your peril," as a sort of legal bow—hat in hand—to terminate the pleasant morning call.

Long-Distance Telephony.

As the author says at the end of his article, the formulæ with which it abounds are not very simple, and it will be impossible within the limits of an abstract to do more than glance at some of the conclusions drawn from the mathematical reasoning.

The three points raised are —

1st. What is the greatest distance over which conversation can be carried on for a certain kind of line?

2d. What effect have submarine or subterranean sections on the air-line?

3d. What sized wire should be adopted?

Preece has shown that the greatest distance at which speech is audible is equal to the square root of the fraction whose numerator is a constant depending on the nature of the line, and whose denominator is the product of the capacity and resistance. This formula takes no account of two very important factors, viz., the insulation of the line and its self-induction. Both these factors are duly taken into account in the author's calculations. He expected that the self-induction would have the effect of reducing the current, and thereby of weakening the sounds transmitted. He was therefore very much surprised, on applying his formulæ to the case of a copper air-line some hundreds of kilometres long, to find that the injurious effect of the electrostatic capacity, far from being increased by the self-induction, was in a great measure counteracted, and that the transmission was improved.

To show clearly the important part taken by self-induction, and how inexact is any rule for finding the limit of hearing from the product of the capacity by the resistance, the author gives the following results to which the theory leads:—

The self-induction has the effect of considerably increasing the current on arrival above the value which it ought to have according to Sir W. Thomson's theory.

In those cases where Thomson's theory shows very unequal weakenings of sounds of different pitch, and consequently considerable alteration in the tone of a complex sound, the self-induction largely prevents this change, and alters completely the character of the transmission.

If the ratio of the self-induction to the resistance—which depends on the nature of the line, and not on its length—goes beyond a certain limit which seems to be reached for copper wires of 4.5 mm. diameter, the tone is not sensibly affected, even when the line is very long. Supposing the self-induction nil, it would be found, on the contrary, that the line deadens the sharp sounds and only transmits the low notes.

Taking as a special case a line of 1,200 to 1,500 kilometres, consisting of two copper wires 4.5 mm. in diameter, fixed about 1½ metres apart, it is found that the strength of the current on its arrival is greater than it would be on a local circuit of the same resistance, but having neither capacity nor self-induction.

A condenser or an electro-magnet inserted singly in a circuit will diminish the current; but if both are inserted in series in the same circuit they correct the reciprocal injurious effects—at least partially.

The greater the self-induction, the more, supposing the E. M. F. equal, the electric undulations will be reduced, but the more regular will be their propagation. If the self-induction is large — or, rather, if the ratio of self-induction divided by resistance to the time of vibration is large—the speed of propagation will be sensibly uniform, and the alteration of the undulations will be small in spite of the resistance. From this point of view, therefore, it is desirable to increase the self-induction or to diminish the resistance.

The effect of leakage on the line is to add to the injurious effect of the factor capacity multiplied by resistance another term, viz., the self-induction divided by the insulation resistance; and to introduce an entirely new term depending on the resistance of the line, the insulation, and difference of potential between two points of the line.

The current arriving at either station is so much the weaker, other things being equal, the nearer the leakage is to the center of the line. An underground or submarine section on the line is more injurious when it is near the middle of the line than when its position is towards either of the two ends.—*La Lumiere Electrique.*

The Drawbaugh Claim.

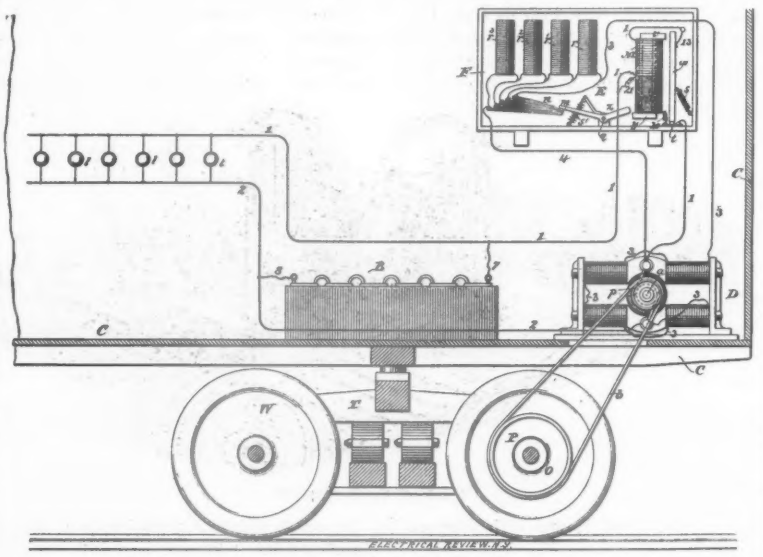
[From the Boston *Herald.*]

The statement in the special dispatch from Washington to the *Herald* concerning the present standing of the Drawbaugh claim would seem to leave a loophole to the patent office to issue a carbon transmitter patent to Drawbaugh, and thus in a measure defeat the result of the sweeping decision rendered yesterday in favor of the Bell Company in every case, and in every point in every case.

An examination of the records shows that on July 21, 1880, Drawbaugh made application for the patent upon which the hopes of his associates are based. It was claimed that, many years before, instruments made in accordance with the specifications included in this application had talked successfully at Eberly's Mills, which was Drawbaugh's home. When the evidence in the Drawbaugh case was taken, instruments similar to these, the originals having been lost or destroyed, made by the Drawbaugh electricians, utterly failed to operate in the presence of the court. According to the testimony of Mr. Henry Bentley, then Western Union superintendent in Philadelphia, and now president of the Bell Telephone Company of Philadelphia, he used the Edison carbon transmitter as early as March 25, 1878. This was two years and four months prior to the date of Drawbaugh's application, and there is ample evidence to show that the Edison transmitter was used by Mr. Bentley and many others continuously from that time on. This being shown to the satisfaction of the patent office, it refused not only to grant him a patent, but to put him in interference with Edison, the law providing that no patent can be granted on an application filed more than two years after the device sought to be patented has been in public use. Hence Mr. Drawbaugh has no standing in the patent office, and nothing but an act of Congress can give him a patent.

It also appears from the record that Messrs. Berliner and Edison are not at the present time in interference in the patent office. They were for a number of years, but a settlement was effected when Mr. Berliner disclaimed the carbon feature, maintaining merely his right to the microphone feature. This would have resulted in the issuing of patents to both had not a new claimant, Mr. Irwin, put in a claim on a patent issued to him in the early days. This claim was beaten before Judge Blatchford, now of the United States Supreme Court. Irwin next sought a reissue of his patent, somewhat amended and broadened, and it is upon this question of a reissue of this patent that Irwin was admitted to interference with Berliner.

It would seem from the above that the question is not whether Mr. Drawbaugh invented the carbon microphone transmitter, but whether, having delayed his application until after the two years allowed by law had elapsed—and that he did seems to be clearly proven by the dates above cited from the record—the patent office has any power to grant him a patent under any circumstances whatever; that is, a patent on the device which had been so long in use. Up to the present time the patent office has declined to recognize him in any way, for he is not even in interference with the applicants for a patent on the variable resistance method in any one of its many forms.



FAURE'S PATENT CAR LIGHTING AND PROPULSION.

* * The electric welding of Prof. Elihu Thomson is rapidly developing into a great business. The practical uses to which this invention can be applied are very numerous. Beside its value in factories for the repair of tools, shafts, etc., and in general "job-work" among machinists, it is adaptable to many forms of manufacturing. In steam and gas fitting, or plumbing, employing either copper, lead or cast iron pipe, as well as in electrical fitting, it will prove invaluable. Every machine shop of any size could profitably employ one or more of these machines, and even an ordinary blacksmith, if power were obtainable near by, could use a small one to advantage. Within the past month, a corporation has been chartered under the style of the Thomson Electric Welding Company, and it is thought that a large factory will soon be built, as there is already a large demand for work done by this method, by manufacturers of all kinds of metal goods.

* * Sir Morell Mackenzie examined the throat of the Crown Prince with an electric lamp. The lamp is appended at the end of what looks like a long, slender penholder, and the proportionately small battery which supplies the electricity is worn about the examining surgeon's neck.

Application of the Storage Battery to Car Propulsion.

A patent issued on March 20, 1888, to the Electrical Accumulator Company of New York, for an invention of C. A. Faure (of secondary battery fame), which possibly may hereafter prove of serious interest to those engaged in electric locomotion by means of storage batteries. The patent is issued on a specification describing the application of electricity to car lighting, but the devices described are also such as are apparently essential to the successful operation of street cars by the aid of electric motors and accumulators carried on the car. Some of the claims of this patent, it is asserted by those who ought to know, are so fundamental in their character as to cover the entire field of the application of storage batteries as a source of current for propelling any sort of car or vehicle.

As this is a subject which will no doubt be one of considerable interest to a large number of our readers, we illustrate the invention and append two of the claims which have been granted, from which our readers may see for themselves whether or not these assertions have ground in fact:

The combination of a car or vehicle, a dynamo-electric machine having its armature mechanically connected with an axle of said vehicle, a secondary battery carried by said vehicle, and electrically connected with said dynamo, and means for varying the strength of the field-magnetism of said dynamo, whereby the dynamo may be used to charge the battery, substantially as set forth.

The combination of a dynamo-electric machine having its armature mechanically connected with a wheel or axle of a moving car, a secondary battery in circuit therewith, a derived circuit containing the field-coils of the dynamo, and means for varying the resistance of said circuit.

Manufacturing Notes.

J. H. Bunnell & Co. have recovered rapidly from their recent disastrous fire, and are filling orders as promptly as ever.

Goodyear says the sales of the E. S. Greeley & Co. "message holder" is so great that he contemplates an ocean voyage this summer on the profits of it.

J. W. Godfrey, general manager of the N. Y. Insulated Wire Company, has built up a splendid business for his company, and is deserving of much credit. And then, he has a good wire.

The New York house of the Western Electric Company has done a bigger business during the past twelve months than ever in its history. Messrs. Thayer and Landon make a strong and level-headed team.

General Agent Bragg, of the U. S. Electric Lighting Company, with headquarters at Philadelphia, came over to see how a live city looked a few days ago. Mr. Bragg has been working up a good business for this company in the benevolent and somewhat somnolent city he inhabits.

The Ansonia Brass and Copper Co., 19 Cliff street, are receiving a number of most flattering letters from their patrons. Nothing pleases a manufacturer more than to know that goods give perfect satisfaction, and when the complimentary letter encloses a big check, they are, as they should be, supremely happy.

Gen. O. E. Madden has accepted the presidency of the Empire City Electric Company, 15 Dey street, New York, and has devoted a considerable portion of his time and great energy to the affairs of this company. Mr. E. W. Carritt, secretary and treasurer, is the active manager, and through the efforts of these two gentlemen, the Empire Company has made large business strides, and is to-day enjoying a very heavy and constantly extending patronage.

Shelbyville, Tenn.—An electric light company. A. Trost and others, incorporators.

Carlinville, Ill.—Electric Light and Power Company. William McClure and others incorporators.

Philadelphia, Pa.—The Merchants' Electric Light Company, of North Front street. Capital, $20,000.

Augusta, Ga.—A. F. Crombe, Supt., will start an electric light plant during the summer, at a cost of $10.000.

Greenville, Miss.—The Electric Light and Power Company. Capital stock, $25,000. H. P. Hawkins and others.

St. Paul, Minn.—The Enos Electric Railway Company. Capital, $2,000,000. C. H. Maclilie and others, incorporators.

Portland, Me.—The Hudson Electric Light Company. Capital, $15,000. Frederick S. Dawes and others, incorporators.

Chicago, Ill.—Fuel and Light Company has been incorporated. Capital, $1,000,000. Otis R. Glover and others, incorporators.

Winchester, Mass. — The Winchester Electric Light Company. Capital, $10,000. James F. Dwinell and others, incorporators.

Marshall, Tex.—Electric Light and Power Company has been incorporated. Capital, $20,000. C. A. Murray and others, incorporators.

Middletown, N. Y.—The Edison Electric Light and Power Company. Capital, $10,000. Alex. Thompson and others, incorporators.

Annapolis, Md.—The Annapolis Electric Company has been incorporated. Capital, $100,000. George Wells and others, incorporators.

Malden, Mass.—The Malden Electric Company has been incorporated. Capital, $20,000. John S. Bartlett and others, incorporators.

Frankfort, Ky.—A bill has been introduced in the legislature to incorporate the Metropolitan Electric Light and Electric Supply Co.

Louisville, Ky.—The Ohio Falls Electric Water Power Co. Thomas F. Gaynor and others, incorporators. Capital stock, $2,500,000.

Chetopa, Kan.—The Western Engineering and Electrical Company of Chetopa has been incorporated with a capital of $10,000, by E. W. Clark and others.

Canandaigua, N. Y.—The Canandaigua Electric Light Company has been incorporated. Capital, $50,000. Alex. Grieve and others, incorporators.

Chicago, Ill.—The Co-operative Electric Light Company. Capital, $25,000. Incorporatives, Rudolph Brant, E. G. Halle, Harry Rubens and others.

Sioux City, Ia.—Gould's American District Telegraph Company of Sioux City, Ia., has been incorporated with a capital of $50,000, by Fred. J. Evans and others.

Wahpeton, Dak.—H. W. Turner, of St. Paul has been granted 21 years' franchise to light the city with electricity. He will furnish ten 2,000 candle lights, at $1,800 a year.

Marshall, Tex.—Electric Light and Power Company. The capital stock is $200,000. W. D. Littlefield, president; W. N. Kennedy, vice-president and treasurer, and C. A. Murray, secretary and manager.

Louisville, Ky. — Articles incorporating the Kentucky Electric Service Company have been filed. Col. John T. Gathright, president, and Mr. J. W. Henning, secretary and treasurer. The capital stock is placed at $25,000.

Chicago, Ill.—The D'Unger Long-Distance Telephone Company of Chicago; capital, $10,000,000; to conduct a general telephone business throughout the United States; incorporators, J. E. Keefe, T. A. Broadbent, and W. L. Copeland.

Eldorado, Kan.—The Reams Electric Programme Clock company of Eldorado, has been incorporated with a capital stock of $100,000 by, J. J. Carson, J. A. Werdeman, J. O. Hoyt, A. M. Burdett, J. E. McCully and A. W. Florea of Eldorado, and A. J. Reams of Augusta.

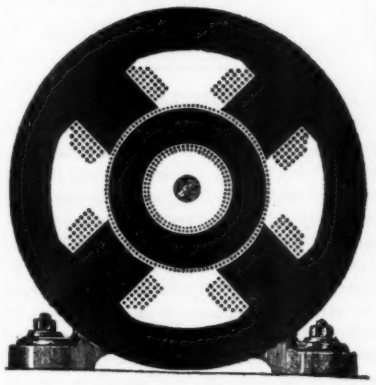


FIG. 2.—FEIN'S MULTIPOLAR DYNAMO.

Columbia, S. C.—C. C. Habenitch, of Columbia, S. C., E. H. Coates, of Philadelphia, Pa., and George A. Shields and others, have incorporated the Congaree Manufacturing Company, capital stock $100,000, to establish a cotton factory at Columbia in the building formerly used as a bent wood factory. The machinery will be moved from Philadelphia, Pa. They will probably put in electric light machinery.

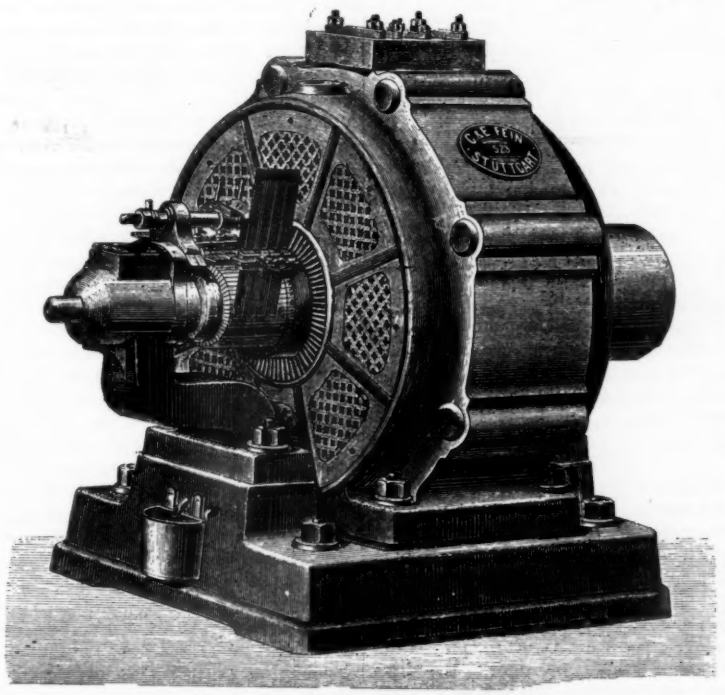


FIG. 1.—FEIN'S MULTIPOLAR DYNAMO.

Washington, D. C.—In the Senate last Monday Mr. Hawley introduced a bill to incorporate the West Washington Electric Lighting, Heating, Motor and Power Company. It names as incorporators Messrs. Jeff. Chandler, H. P. Gilbert, George Hill, Jr., T. W. Royce, D. I. Murphy, of the District; Geo. W. Wilson, James S. Hambird, James M. Gaffey, of Pittsburgh, and Caleb H. Jackson, of Allegheny City, Pa.

Framingham, Mass.—The Framingham Electric Company, organized at Portland with a capital stock of $100,000; amount paid in, $20,000; par value of shares, $25. The stockholders are Samuel O. Daniels, Natick, Mass.; William C. Woodward, Boston, Mass.; Henry L. Sawyer, James R. Entwistle and Luther F. Fuller, Framingham, Mass. Samuel O. Daniels is president, William C. Woodward, treasurer, and Henry L. Sawyer, William C. Woodward and Samuel O. Daniels are directors. The purposes of the corporation are furnishing electric light, heat and power.

Fein's Multipolar Dynamo.

Our engraving, Fig. 1, shows the Multipolar Compound Dynamo brought out by Messrs. C. & E. Fein, electrical engineers, of Stuttgart—in elevation, the type represented being that with four poles. The section, Fig. 2, shows the arrangement of the magnetic field, which is formed by two magnets of rectangular section. These dynamos are compound, and it is possible to turn off any number of lamps up to the last one without affecting the power of the others, the use of electric force being regulated automatically. It is claimed that the current is produced without any sparking, in consequence of the small number of windings of the motor and of the force of the magnetic field, so that the using up of the brushes and of the collector is reduced to a minimum. The capacity of the dynamos will be gathered from the following interesting table:

Type.	Capacity in Volt-Amperes.	Amperes at 110 Volts.	Amperes at 65 Volts.	Feeds.		Revolutions per minute.	Power Required in H.P.	Electric-Magnetic Poles.
				Incandescent Lamps of 16-20 Candle-Power	Arc Lamps of 400 C.P.			
I	7,000	65	108	120	30	950	11.5	4
II	10,000	90	154	170	44	850	15.5	4
III	15,000	136	230	250	66	800	24	4
IV	24,000	218	370	400	100	650	38	4
V	36,000	327	554	600	160	500	55	6
VI	54,000	490	830	900	240	350	85	8

—*Invention.*

Electric Clublets.

There are three tickets in the field for the annual election, all of them having President H. C. Davis' name at the head. The tickets differ in the names of candidates for the Board of Managers, and in this respect there is enough friendly rivalry to make the election an interesting one.

Messrs. Burnham, of Boston, and Manson, of New York, were recently entertained by Fred. W. Royce, of Washington, D. C., whose gray moustache has of late become the signal flag of dignity, acting as a restraining influence for all friends with levity inclined. The Electric Club was toasted (all three being members), and all resolved to be present at the annual meeting, April 19th.

Prof. E. L. Nicholls, of Cornell, and his class in electrical engineering, were Club visitors Thursday and Friday evenings of last week, when they all found much to interest and admire. The professor and his twenty bright pupils visited a number of the leading electrical establishments of the East, and, of course, went up to the Mather Works, in Manchester, Conn., where Cornell's former professor of physics was found reigning supreme in his fine new laboratory. Prof. Nicholls, Managing Editor Chambers of the N. Y. *Herald*, and others, were handsomely dined at the Electric Club, by Dr. Otto A. Moses, Saturday evening.

BOOK REVIEWS.

Electrical Instrument Making for Amateurs.—173 pp. S. R. Bottome. London, Whittaker & Co.; New York, D. Van Nostrand. $1.20

The author is well-known to the amateur mechanics of England and America through the columns of the *English Mechanic*. A portion of the matter in this work has appeared in the *English Mechanic*, and the experience gained by the author in replying to hundreds of questions in that paper has been employed to good advantage in compiling this handbook. It is devoted to electrical instrument making, the author having treated of dynamo building in an earlier work. The few tools required may be found in many households, a lathe while very useful is not absolutely needed. Full instructions are given for the construction of voltmeters, ammeters, induction coils, condensers, batteries, electroscopes, frictional machines, thermopile. The figures, 59 in number, while not ornamental pictures, show clearly the form, method of construction, and size of the respective parts of each machine. The author is a teacher of science, and his style is within the comprehension of those not educated in the science of electricity, though the work does not profess to treat of the science of electricity which can be obtained from some other book. While written for amateurs, practical electricians will find this a valuable handbook.

Practical Physics for Schools and the Junior Students of Colleges.—Balfour Stewart and W. W. H. Gee. Vol. I. Electricity and Magnetism. 221 pp. 98 illustrations. Macmillan & Co., New York.

The larger work of the same authors on electricity and magnetism was called elementary, though far more complete and difficult than the present work, which is, to a certain extent, an abstract of the former work.

It is written by real teachers who are able electricians. Instructions, diagrams and illustrations make the construction of the apparatus at a small expense comparatively easy for the most inexperienced workman. There is no better book for one to gain a knowledge of the subject without a teacher. The illustrations are, to a great extent, new and are models of clearness. The work is divided into lessons, and these again into description and experiments. The materials required are first given, then the construction and arrangement of the apparatus is explained. The experiments are so classified that one phenomenon is studied at a time. Very little algebra is employed. In fact a fair knowledge of arithmetic only is required to understand all but a few pages. It should be in the hands of every student of the subject, especially those who do not have the advantages of a teacher.

Dynamo Tender's Handbook.—By F. B. Badt, Chicago. Small 12mo, 90 pp., illustrated with 70 practical diagrams and engravings. $1.00.

Of all the volumes which have hitherto been published relating to dynamo electric machines and their operation, few of them have gone into the practical details of the care of the machines and general equipment of the station in such manner as would enable unskilled attendants to comprehend and carry out.

This little book is unique in its simplicity of language, its avoidance of the hard words and the technical expressions and definitions of the ordinary text book.

It is exactly what its name indicates, and to dynamo tenders, engineers, linemen and others, who are daily looking after plants and parts of plants, this little book is full of information and points, which it is needless to say the author is most competent, from his extended experience, to give. The whole book is full of illustrations, and is written in such a manner "that he who runs may read."

The portions devoted to "diseases of dynamos" and the remedies therefor, the chapters on arc lamps, instruments, and various ready methods of testing for faults anywhere in the system are specially worthy of attention. In fact the book contains information for everyone interested in electric lighting, and should be in the hands of all station attendants and linemen.

For sale at this office.

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☞ No attention will be paid to communications without the *name and address of the writer.*

We invite correspondence from Electricians, Inventors, and the Telegragh and Telephone fraternity and those engaged in Electric Lighting, on matters pertaining to electrical and scientific subjects, and all facts of special interest in connection therewith.

We extend to manufacturers of electrical apparatus an invitation to send to this office any and all facts concerning their business which will be of interest to the public. We make no charge for publishing news.

Subscribers can at any time have the mailing address of their paper changed by sending both old and new address.

Timothy W. Sprague, Massachusetts Institute of Technology, is our representative at Boston, Mass.

Mr. C. C. Haskins, 118 La Salle Street, Chicago, Ill., represents the REVIEW in the West.

NEW YORK, APRIL 7, 1888.

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"Scienticulist" is the linguistic contribution to the dictionary by London *Electrician*. And that is an excellent description of the party who evolved it, we have no doubt.

The ELECTRICAL REVIEW will be 10 cents a copy hereafter. Although, improved in many respects at much continuous cost, the subscription price will remain the same—$3.00 per year.

It should be a source of pride to every man in the electrical business that a laboratory of the magnitude of the one recently completed by Mr. Thomas A. Edison at Orange, N. J., is in existence.

It looks as if the incandescent lamp patent question were going to be fought out at last. Judge Acheson of Western District of Pennsylvania, in the suit of the Westinghouse Co. against the McKeesport Edison Co., the other day refused the demurrer of the latter, and ordered answer to be filed to the suit. Now for the smoke of battle. The suit is based on the Sawyer-Man patent for filaments of carbonized vegetable fibre.

The ranks of the alternating current army have received a recruit in the Anglo-American Brush Electric Light Corporation, in England, who take up the system under the improvements of Mr. Mordey, who brings out both a new alternating current machine and a transformer. What does Mr. Crompton say to this?

The Grand Jury at Memphis, Tenn., has indicted the superintendent of the electric light station in that city, on account of the death of a colored man who received a shock from an electric light wire. As an indication of the jury's conservatism in the matter of defining electricity, the following is a quotation from the indictment: Whereas, said superintendent "erected a certain wire which contained or was charged or filled with some substance, quality, agency or essence, to the Grand Jury unknown."

It is somewhat premature to speculate on the uses of the phonograph, but we venture the suggestion that some day it will take the form of an automatic novel reader, with each character speaking, as it were *in propria persona*. That is the phonogram will be produced with the various voices as in nature, all the inflections of passion, sorrow, sympathy, ridicule and sarcasm, and songs, etc., uttered to it originally by professional elocutionists, dialecticians and singers. Certainly a novel gotten up in that way would be a great treat.

A despatch from Rochester, N. Y., says that a meeting was held there by members of the city council and a representative of the Bell Telephone Company of Buffalo, at which an agreement was reached which will settle the telephone difficulty which has existed there for the past eighteen months. At present, there are less than 160 members of the local exchange, while prior to the strike there were about 800. The contest with the telephone company was one of the greatest in the city's history, and we are glad to learn that a satisfactory settlement of the differences has been made.

The Bell telephone decision has nowhere aroused greater excitement than in St. Louis, where the Pan-electric system had obtained a strong foothold. The Bell Company the other day made a demand upon all persons using Pan-electric instruments to deliver them up for destruction. This will be a very easy order to obey, for those who own their telephones outright, and can do whatever they choose with them; but it will be harder for those who rent them, and have therefore no right, as they see it, to turn them over to any one else. If they refuse to deliver up these instruments, they are threatened with a suit for infringement by the Bell Company. If they do deliver them up they are threatened by the company which owns them. There is a cheerful reminder in all this of the alternative of the devil and the deep sea.

WHY LIGHTNING CAUSES THUNDER

The explanation of the devious path taken by the electric current as lightning, may also be followed up to account for the flash and the thunder following. It is said the current darts through the irregular bodies of air which are most laden with watery vapor, and hence of lower resistance. If so, does not the tremendous energy of the current produce an instantaneous decomposition of the water into hydrogen and oxygen? And do these not immediately come into contact and cause explosions of tremendous violence by their union, and produce the familiar but awful reverberations of thunder and the vivid flashes of lightning?

THE BELL COMPANY'S REPORT.

The report of the American Bell Telephone Company for the year ending December 31st, 1887, given in full in our columns to-day, comes at the time when public attention has been very generally directed to telephone interests. The recent decision of the Supreme Court, as well as the success of the telephone company's long-distance lines during the recent storm, have been the subject of daily comment in the papers, and have led to the more general knowledge of and interest in the company's affairs than has existed heretofore. The business of the year was, on the whole, satisfactory. The number of outstanding telephones increased over 26,000, the total now being 380,277. The total number of subscribers is now 158,732, a gain of 11,664. The number of employees has increased 339 to 6,182. The number of exchanges has been increased by seven, and now stands at 743, while the number of branch offices is less by two than it was a year ago, standing at 444. The total wire mileage is 145,732, a gain of 17,501. The more detailed figures with regard to these interesting matters will be found in the report itself. It is notable that the daily calls per subscriber have increased from $5\frac{82}{100}$ to $6\frac{37}{100}$, a gain of nine per cent., showing that among those who have and use the telephone it is called upon with considerable more frequency than heretofore. The finances of the company are in a flourishing condition. Its total net earnings were $2,237,608.12. It has paid out in dividends during the year $1,568,336, and has a total surplus of $2,028,035.92. The reference to the company's patent litigation is very brief, and in the matter of the Supreme Court decision, it states concisely what every one knows, viz: that the scope of the patent for which it has contended was sustained by the court, and that with the exception of the oral dissent of three of the justices the opinion of the court expresses the unanimous opinion of all of its members. It is believed by the directors that the result of the Indiana legislation has been so unsatisfactory to the subscribers, and that the inexpediency of crippling the companies is so obvious, that no measures regulating telephone rates will be adopted by the legislatures where such regulation has been proposed. Concerning the committee appointed by this State to investigate telephone charges, the directors say that the report of the committee itself furnishes the best arguments against the passage of the bill which they propose recognizing, as it does, the great cost of underground work and of the frequent changes in apparatus made requisite by the rapid strides in electrical inventions. It is gratifying to know that the income from the long lines is now more than sufficient to meet current expenses, and that there is every reason to believe that before next year they will pay a moderate profit. It is authoritatively announced that the lines are to be extended westward from Albany towards Buffalo, and that a line is to be built from Chicago to Milwaukee, at an estimated cost of $1,000,000 in round figures.

There has been more or less talk among those who had no information upon the subject to the effect that long distance "rights" were to be given to the stockholders, and also that an extra dividend would be paid in view of the company's success before the Supreme Court. Nothing of the kind appears in the report, and it is fairly safe to assume, considering the conservative policy which this company has always followed, that nothing of the kind will be done. It must be remembered that a certain proportion of the capital stock of the company represents the cost to it of the patents upon which the business is founded, that every passing year shortens the life of those patents, and that there is wisdom in making such an investment of the surplus earnings over and above reasonable dividends as will take the place of the patents when they have ceased to exist.

For the first time in the history of the company its patents are unclouded and its licensees, who have been restrained from investing capital by the uncertainty which surrounded the business, will now confidently increase their plants and bring telephone facilities within the reach of many who have never had them before. We look, therefore, for a very prosperous year in the telephone business and for a considerable increase in the earnings, not alone of the parent company, but of the licensees as well.

OUR CHICAGO LETTER.

(Special Correspondence.)

Somebody has made a wonderful discovery which no one can prove, and gives another opportunity for employing a corporation fool killer. The statement has gone abroad that the city's river plant "charges" the lamp posts to such a degree that a man was recently knocked almost senseless at one of the bridges. Considering the facts, that the entire line is run with lead-covered Patterson cables, that every lamp is thoroughly insulated, and, finally, that electrical tests don't show any ground or leak, the story is, so to speak, pretty tolerably thin.

That brings up the terrible affair at Dayton the other day, when Mr. Burrows was so nearly killed while answering a telephone call, the wire having become "charged" by contact with the incandescent wires. It was such a peculiar, as well as very unfortunate, case that a letter was written asking for full particulars, including the name of incandescent system in use. Back came answer, as follows:

CENTRAL UNION TELEPHONE COMPANY,
DISTRICT SUPERINTENDENT'S OFFICE,
DAYTON, O., March 17, 1888.

C. C. HASKINS, ESQ.,
Chicago, Ills.,

DEAR SIR:—Replying to yours of 16th inst. in reference to the sensational report of accident to Mr. Burrows, I would say that the whole matter is this: He was standing holding his telephone (in answer to a call) at arm's length, looking over the diagram of the Opera House *with a finger on each of the binding posts* of the telephone, *one side of the telephone cord being loose*, and some impatient subscriber gave him a very strong ring which, of course, went through his fingers and gave him a terrible shaking up. There was no crossing of wires because neither the electric light company nor the telephone company knew a thing about it until it appeared in the newspapers the next morning; and Mr. Burrows pronounces the articles that have appeared in the papers the most ridiculous he ever saw in print, which is saying a great deal now-a-days. Our incandescent system is the Edison.

Very respectfully,
W. H. BUSSARD, Supt.

The Superintendent of Public Service, Mr. John Benham, and Commissioner Frank M. Blair, have been figuring for some time on Prof. Barrett's scheme of uniting the plants, as far as possible, belonging to the city and county, and running these together at *pro rata* expense. It is claimed that after the necessary changes are made in system there will be a large saving in cost through the consolidation. The matter will come up in council immediately after the usual spring skirmishing attendant upon appropriation bills and like interrupters of the regular labors of that august body of Solons.

The Co-operative Electric Light Company, of Chicago, has been recently incorporated, with $25,000 capital stock. The incorporators are Rudolph Brand, E. G. Halle, Harry Reubens, and others.

Alderman Clarke is doing all in his power to induce the council to arrange for a municipal electric light plant, on the basis of figures collated last year by Professor Barrett. The alderman was before the finance

committee, the other day, asking for an appropriation clause of $100,000 in the annual budget for this purpose, and said if this was refused he should go personally before the council and advocate the proposition. As the proceedings of the finance committee, among the very few things on the American continent a newspaper man cannot get hold of till afterwards, no one knows how far Alderman Clarke has progressed with his plan; but everyone wishes it may go through somehow.

Wabash, Indiana has a proposition from the Wabash Electric Light Company for furnishing the streets with 127 incandescent lamps of 30 c. p. each, for which service the proposed charge is $2,500.

A new electric light company, the "Mutual," is before the council, asking permission to lay wires and establish central stations in the north division of the city. All wires to be laid underground, and the franchise not to extend longer than fifteen years. The ordinance was referred to the committee on gas.

The present river plant of electric lights is working so satisfactorily that the city officials are anxious to see it extended. To aid in this accomplishment the Council has appropriated $30,000 to be used in making additions to the present outfit. Some of the five engine-houses are fitted out with an arc light over the front door which aids greatly in getting fire apparatus out of the house in a hurry, with greater safety than before.

The day may come in after years when electricity will not be made the scapegoat in all cases of mysterious and unexplained conflagrations, where it is possible to charge it with that class of crime. At Fulton, Mo., some time in the latter part of February, the State Deaf and Dumb Asylum burned. The "sit arounds," "do nothings," and "tell alls," —three classes of citizens found in all small towns—North, as well as South, started the story that "them electric wires done it." An investigation by the authorities has clearly shown that the fire occurred in a portion of the building where there had been no electricity for over six months.

Chicago has another telephone that is going to out do Bell. It is entirely different, of course, while using the electro-magnet, and the worn out chestnut of using artificial resistance to represent length of line, is made to do duty as proof of the extremely far away distances over which the thing will work.

Over in Ohio some three or four years ago, a trick which this brings to memory was exhibited, in which two instruments were connected to earth, in the same building, and the other poles connected to telegraph wires leading almost to the Pacific coast and back again. It was claimed that the telephones talked to California and back! Somebody might have believed it but for one Smith—Smith of Kansas City—who suggested that it would work still better if the wires were cut at the distant end—and it did, but that finished up that long distance fellow. The moral of this story is that newspaper science and inventor's manipulations are not the sort of guarantee for money investments.

There are inventors, too, who are deceived. In a city not a thousand miles from Milwaukee, there lives one of these. He invented a shunt wound incandescent machine. If he had not told of it, the average electrician would have said it was one of the first made by a now prominent company. He sold a plant and wired the building, bought lamps and put them in. He put in safety strips, and as he could not get the right size he took large ones. Somebody asked him:

What is the ampere capacity of your dynamo?

What is the pressure?

At how many revolutions will it do best?

What amount of current will your ampere strips carry in safety?

To all of which he replied I don't know; and when asked what current does your lamp require? He answered like a snap shot, just what the seller had told him.

It is sufficient to say that the plant never has run—probably never will; and the Wisconsin capitalist who put his money into the enterprise because it was cheap, and to encourage home talent, probably wishes himself out of a bad scrape. The lesson is worth something to capitalists perhaps.

C. C. H.

CHICAGO, APRIL 2, 1888.

OUR BOSTON LETTER.

(Special Correspondence.)

The Citizens' Association have issued, in pamphlet form, the grounds of objection suggested by them to the order now before the board of aldermen, granting to Henry E. Cobb and others an exclusive right to lay electric subways, for twenty years. The first claim is that the order would be illegal. Their reasons are fully set forth, and many authorities and decisions quoted, strengthening their belief. Then, granting the law to be legal, it is open to many serious objections on grounds of public policy and expediency. A full discussion of their position in this regard is also put forth and able arguments advanced to sustain it. The outcome of this controversy will be awaited with interest.

The Thomson-Houston Companies have outgrown their present offices on Devonshire street, and will shortly occupy several more large rooms on the north side of the building.

The firm of Pettingell & Co. are now occupying their commodious new quarters, corner of Congress and Franklin streets. The firm represent the following companies: The Okonite Co., of New York; Cleveland Motor Co., N. Y.; Phœnix Glass Co., Pittsburgh; Forest City Electrical Works, Cleveland, O.; and the Parker-Russell Mining and Manufacturing Co., of St. Louis.

The legislative committee on manufactures reported a bill to authorize the consolidation of gas and electric light companies, subject to the approval of the gas commissioners. The bill was afterwards tabled.

The House, by a large majority, rejected the bill to incorporate the Postal Automatic Telegraph and Construction Company.

At a meeting of the city council, last week, Mr. Hayes of ward 12 presented the following: Ordered, that the committee on judiciary be requested to obtain the opinion of the corporation counsel as to whether the City of Boston, through its board of aldermen or city council, has the right under the law of eminent domain to compel the telegraph, telephone and electric lighting companies to attach their wires to the rears of buildings, instead of to poles, as is now done. The order was passed.

Dr. Mason, of the Simplex Company, sailed for Europe last week, combining business with a partial pleasure trip.

Boston electrical men were kept busy the first of the week. On Monday evening the Electric Club dined at the Hotel Thorndike, and in spite of the bad weather about seventy-five members and friends enjoyed the good things edible, which were thus bountifully provided. After the cigars were lighted Mr. Thomas D. Lockwood of the Bell Telephone Co., was introduced and held the close attention of his hearers for over an hour by his paper, entitled "The Inevitable Anticipation." The knowledge shown of ancient and modern inventions and discoveries, electrical and otherwise, evidenced the deep research of many hours in the preparation of the paper which proved highly interesting. President Alexander then called upon Mr. Charles Dutton, the popular secretary of the House Committee of the N. Y. Club, who made a very witty speech, afterward complimenting the Boston Club and asking its members to call upon the sister organization in New York. Mr. A. H. Chipman, chairman of the House and Entertainment Committee, then took the chair and very cleverly introduced Messrs. Pierce of Boston, Wright of Springfield, Cleverly of Philadelphia, W. J. Denver, Rev. Mr. Cleveland and Mr. Lockwood again, all of whom made brief remarks.

On the same evening the inductive telegraphy system of the Consolidated Railway Telegraph Co., of New York, was being exhibited at the United States Hotel, by Samuel K. Dingle, of New York, the assistant superintendent of the company, and Mr. T. H. Knox, its Boston representative. The system is now so well known to the readers of the REVIEW and also its excellent operation on the Lehigh Road, that it is only necessary to say that the exhibition, which was repeated on Tuesday evening, was entirely satisfactory and was much enjoyed by a large number of spectators including prominent railroad and electrical people.

On Tuesday afternoon and evening occurred the gathering which resulted in the formation of the new Electric Exchange, an account of which appears elsewhere. A meeting of the board of officers of this Exchange was held on Saturday afternoon at the office of Mr. Frank Ridlon, president Alexander presiding. A circular was drafted, which will be sent to all electric light companies in New England, telling what the exchange is intended to be and what it proposes to accomplish. The committee will meet again on Saturday and will make a full report at the April meeting.

A sad accident occurred at the Lynn works of the Thomson-Houston Co., on Friday by which Mr. H. H. Leavitt, a popular young employee of the company met instant death, through no fault of the company however. Mr. Leavitt had been in the employ of the company for about three years, but had only been in Lynn for about six months. This morning he came to his work as usual and up to 10.30 worked on motors. This portion of the work is a particular job and soon tires a man, and after working on them for four hours, he remarked to a fellow workman, "I guess I will change the work just a bit and for curiosity will take the tension of one of our arc lights." He went to his chest of tools and took from it an instrument that is known as a volt meter. This he attached to a wire and then formed a circuit of electricity sufficient to furnish light for 52 arc lamps.

When he was about to make the test F. A. Pullman stepped to the table on which the instruments were placed to watch the experiment. As Mr. Levitt was working his volt meter with his left hand, he allowed his right to come in contact with the other line instrument and with a terrible cry of pain he fell back on the floor dead. This is the first serious accident which has ever happened at the Thomson-Houston works.

Mr. A. H. Chapman, Chairman of the House and Entertainment Committee of the Electric Club has felt obliged through a press of other duties, and illness in his household, to resign that position. His place will be a difficult one to fill as well, and his earnest work for the club, will be greatly missed, though this will undoubtedly be continued as far as possible.

Mr. Louis Burnham, of the Electric Gas Company, has returned from his extended southern and western trip in good health and spirits. He finds business lively at the Boston office.

The incandescent plant recently spoken of as established in Newport, R. I., is a New York Accumulator plant, one of Mr. Moriarty's installations. Mr. Moriarty has also put in a private accumulator plant of 75 lights for private houses at Leicester, Mass.

A complaint recently came from a chemical works, that the wiring in the buildings had became leaky and valueless. The wire was removed and found to be in a nearly perfect condition, but the joints were the weak points. Acid soldering had been employed. T. W. S.

Boston, Mass., April 2, 1888.

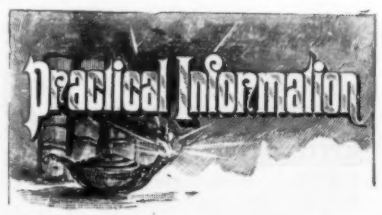
Telegraph College Frauds.

Ever since the days when genial Jim. Ashley poured hot shot into the telegraph college frauds there have been spasmodic efforts to brush them into the sea of oblivion, or surround their proprietors with solid walls, but somehow, Phœnix like, they rise to the surface again like corks and proceed as before. The lamented Ashley had always a warm corner for that class of swindlers in the *Telegrapher*, and did much in the way of keeping the lambs out of the reach of these wolves.

New York's good mayor has adopted what seems to be the only method of extinguishing them, and Mayor Roche, of Chicago, has adopted the New York plan. They have a concern in Chicago, its two signs spread over the windows so as to read on one of these, "Western Telegraph Co., New York," and the other, "Union Telegraph Co., Chicago." The *Western* and *Union* are readily taken to be part of the same sentence, and in this way the observer takes the sign to mean Western Union Telegraph Co., New York and Chicago.

There is no law evaded by which the business can be stopped, so, hereafter, no person will fail of learning from a policeman, who stands "handy by," the character of the so-called school. In future,

"Who enters here leaves hope behind."



Galvanic Cell.—The cell contains zinc in an alkali. The polarisation is prevented, not by oxide of copper, but by oxide of mercury, which, by dissolving in the alkaline solution, amalgamates the zinc. In order to increase the surface it may be mixed with iron shavings.

Electrical Water-Level Indicator for Steam Boilers.—At the meeting of the Franklin Institute, Philadelphia, Pa., on the 21st, Mr. Morris P. Janney described a new electrical water-level indicator for steam boilers, by Charles Wickersham, of Pottstown. It is a device which will constantly indicate by means of a dial and index, the height of water, and shows its rise and fall in inches and fractions. Attached to it is an electric annunciator, with visible and audible signals for indicating at any distant point the variation of water-level in the boiler beyond the prescribed limits.

How to Make the Telephone Transmitter More Convenient.—Put an iron brace between the transmitter and the back board, securely screwed on and long enough to make the transmitter front come out even with the magneto bell. This brings the transmitter in a much more convenient position for talking into, and the subscriber does not bruise his head against the magneto bell —a common occurrence with some excitable subscribers.

Construction of Resistances.—A cheap form, not too bulky, and which affords a large surface for the radiation of heat, can be made of thin hoop iron bent into zig-zag shape. Narrow bands of iron wire gauze make an effective resistance for the purpose of testing dynamos, as it affords great cooling surface, and can therefore be made to take a very high current density. One yard of hoop iron, about half an inch wide and one thirty-second of an inch thick, measures about one hundredth of an ohm; hence 100 yards an ohm. Pencils of electric light carbon are sometimes employed as resistances. One difficulty with them is getting effective contacts. Prof. Fleming says that the best plan is dip the carbon ends in molten paraffin, and after they are well saturated, let the wax harden, then file the surface to free it from wax, and electrotype the ends with copper, and then tin them by dipping in melted solder. To these ends wire can be soldered.

To Find a Ball in the Human Body.—Prof. A. G. Bell has devised a method of ball-finding which involves the insertion of a needle where the ball is supposed to be. This needle being connected by wire with one terminal of a telephone, while a metallic plate laid on the skin is connected with the other terminal, when the point of the needle reaches the ball a current arises (the ball and metallic plate naturally forming a couple) and a sound is heard in the telephone. The needle can be easily inserted, in several places, with scarcely any pain.

Electric Smelting.

A hearing in interference proceedings is progressing between Mr. Camille A. Faure and Messrs. Cowles, of the "Cowles Electric Smelting & Alumium Co.," of Lockport, New York.

Mr. Faure filed applications some time ago in the United States, based upon his inventions, patented in Europe in 1882. The applications are allowed, but can only be passed to issue upon the above proceedings terminating favorably for him.

One of his patents in Great Britain was purchased last year by Messrs. Cowles who are pushing Electric Smelting processes in England.

The electric motor for driving power, in place of steam, is receiving quite a complimentary recognition among the industrial establishments of St. Louis, Mo. There are now no less than eleven different establishments using electric motors.

TELEGRAPHIC

.... The State has been sustained by the Supreme Court, which decides that the Western Union Company must pay the taxes imposed in Massachusetts.

.... In England, under government management, twice as many operators are employed to handle the same number of dispatches as are handled in this country by operators employed by a private company. The wages paid telegraph operators here are about double those paid in great Britain.

.... The stockholders of the Delaware River Telegraph Company have re-elected the old board of directors, as follows: J. J. Burleigh, William S. Conner, William B. Gill, Charles A. Jauke, Richard T. Smith, Frank L. Vinton and Edward H. Green. The board organized by the election of William S. Conner as president, and J. J. Burleigh, secretary and treasurer.

.... An interesting and pleasant little incident occurred on Thursday of this last week, at the office of Chas. A. Cheever, Esq., at 13 Park Row. It was the occasion of the presentation of a testimonial to that gentleman by some of those who have been associated with him in Induction Railway Telegraphy for some time past. Mr. Henry D. Hall, in a few graceful words, presented Mr. Cheever on behalf of the gentlemen interested an artistically framed collection of photographs.

.... It is very interesting work keeping up telegraph lines in Mexico. Travelers on horseback in northern Mexico traversing these vast, treeless and melancholy plains stop at night for camp, and, finding the telegraph poles accessible and admirably seasoned, cut them down for firewood. And this is not all. The humble ranchero, desiring a stock of wire with which to fence in an enclosure, goes with his peon servants and cuts down a mile or two for use, leaving poles oftentimes prostrate. Wireless poles, and also long stretches of wire without poles, are often seen. And the poles brought so far at so great an expense have other enemies besides man. There is the insignificant looking worm, the "jengen," which insidiously honeycombs the poles till some fine day they fall at the breath of a breeze, strewing fragments of wood over the ground. This is a formidable opponent of telegraph communication in Mexico, and any bright American who can show how to keep it out of the poles may fairly demand a reward from the Mexican Government.

Queer Weather Telegrams.

"Rattletraps, pigs' tails, and porcupines" was the telegraph river report received by the signal office one morning. Obviously, that means that the Monongahela was rising, that there had been nearly a seven foot gain during the day, that the rainfall was 0.58 inches, and that the wind was from the northwest. "Coal scuttles, flour bins, and fire balloons," was the message from Morgantown. Naturally, that meant a rising river, 5 feet 6 inches of a change, 0.35 inches of rainfall, and a northerly wind.

The signal service does all its reporting in cipher. All river messages are received in the above kind of language. It is a laughable thing to have to call at the office at an early hour on business and hear the jargon that is being called out from the telegrams. The oddest words in the language seem to have been selected to form the cipher. The use of a cipher at all is characteristic of the difference in the management of a government department and a private concern. It is difficult for an ordinary mind to see any need for it. The only conceivable theory it can be justified on is that the department was at one time a branch of the military service, and that therefore the fiction should be kept up that some mysterious enemy was in the country whom it was needful to delude. Many people will be apt to think that, with all due respect to the department, it could not delude an enemy worse than by furnishing him with some of the predictions that are daily furnished to the innocent public.

The Western Union Taxed in Massachusetts.

A decision has just been rendered by the United States Supreme Court in the case of The Western Union Telegraph Company *vs.* The Attorney General of Massachusetts. The suit upon which this appeal arose was brought to enforce the collection of a tax levied by the state authorities, and to restrain the company from the further operation of its lines within the limits of the state until the tax should be paid. The telegraph company contended that it should not be compelled to pay the tax for the reason that only 498 miles out of 2,883 miles of its line within the state were over, under or across post roads, made such by the United States, and that by virtue of its acceptance of the provisions of sections 5,263 to 5,269 of the Revised Statutes it had a right to exercise its functions as a telegraph company over roads declared by law to be military and post roads of the United States, without being subject to taxation by the state authorities. The Supreme Court decides against the contention of the company, holding that the statute which grants telegraph companies the privilege of running their lines through and over any portion of the public domain and along post roads is merely a permissive statute, and that "there is no expression in it which implies or confers any exemption from the ordinary burdens of taxation. While the state cannot interfere to prevent the telegraph company from placing its lines along these roads or to stop the use of them, nevertheless the company receiving the benefit of the laws of the state for the protection of its property and its rights is liable to be taxed upon its real or personal property the same as any other corporation or person would be. It never could have been intended by Congress in conferring upon a corporation of one state the authority to enter the territory of any other state and erect its lines therein, to establish the proposition that such a company owed no obedience to the laws of the state into which it thus entered, and was under no obligation to pay its fair proportion of the taxes necessary to the state's support. If the principle now contended for be sound every railroad in the country should be exempt from taxation, because they have all been declared to be post roads, and the same reasoning would apply with equal force to every bridge and navigable stream throughout the land." The court holds that the tax assessed against the company is a valid tax.

The Telephone in Europe.

The growth of the telephone system in Europe shows great variation in the several countries during the three years from the end of 1883 to the close of 1886. The increase in the number of telephone lines was greatest in Switzerland, where it was 1,700 per cent. (from two in 1883 to 36 in 1886); Germany, 333 per cent. (from 21 to 91); Austria, 267 per cent. (from 3 to 11); Russia, 233 per cent. (from 6 to 20), and Sweden, 200 per cent. (from 5 to 15). Belgium and Holland follow a long way behind, with an increase of only 50 per cent. (from 10 to 15). In Italy the number of telephone lines increased but 23 per cent. (from 13 to 16); in Great Britain, 19 per cent. (from 75 to 89), and in France, 11 per cent. (from 18 to 20). Germany had at the close of 1886 the largest number of telephone lines, 91, and Austria the smallest, 11. The increase in subscribers has been in proportion to the growth in the number of lines. Switzerland here also heads the list, subscribers having increased by 486 per cent. (from 835 in 1883, to 4,900 in 1886). In Germany the increase was 308 per cent. (from 3,613 to 14,733); Russia, 291 per cent. (from 1,451 to 5,280); Sweden, 267 per cent. (from 1,553 to 5,705); Austria, 248 per cent. (from 870 to 3,032); Belgium and Holland, 151 per cent. (from 2,331 to 5,858), and Great Britain, 107 per cent. (from 7,287 to 15,114). France and Italy are at the bottom of the list, the increase in the number of subscribers in the former country having been only 62 per cent. (from 4,437 to 7,175), and in the latter, 52 per cent. (from 5,507 to 8,346). Great Britain still had the largest number of telephone users, 15,114, Austria the smallest, 3,030.

The Report of the American Bell Telephone Company.

OFFICE OF THE AMERICAN BELL TELEPHONE COMPANY, BOSTON, March 27, 1888.

TO THE STOCKHOLDERS:

The business of the company for the year 1887, has been, on the whole, satisfactory.

The receipts for royalties show a reasonable increase; and the licensed companies, with few exceptions, have improved and extended their plant.

The statistics are given in the following tables:

The so-called Government case, begun in January 1887, came up June 13, for argument on our demurrer to the bill of complaint, and on September 26, the court sustained the demurrer and dismissed the bill. The Government has taken an appeal to the Supreme Court, and a motion to advance the case for speedy hearing was made in October, upon which there has as yet been no decision.

The Globe Telephone Company, owning the Meucci claim, was finally enjoined in July. This case has also been appealed to the Supreme Court.

EXCHANGES.

	1883.	1884.	1885.	1886.	1887.	1888.	Decrease from 1887.	Increase over 1887.
Exchanges	725	906	772	747	736	743	....	7
Branch offices	345	419	481	428	446	444	2	
Miles of wire on poles	.....	.....	88,481	100,332	111,349	127,902	.....	16,553
Miles of wires on buildings	.....	.....	11,886	10,043	10,587	9,458	1,129	
Miles of wire underground	.....	.....	1,225	3,417	6,030	8,009	.....	1,979
Miles of wire submarine	.....	.....	.....	254	265	363	.....	98
Total miles of wire	68,571	85,896	101,592	114,046	128,231	145,732	.....	17,501
Total circuits	74,484	97,422	107,440	112,067	121,260	131,896	.....	10,636
Total employees	3,716	4,762	5,168	5,438	5,843	6,182	.....	339
Total subscribers	97,728	123,625	134,847	137,750	147,068	158,732	.....	11,664

EXTRA-TERRITORIAL LINES.

	Jan. 1, 1883.	Jan. 1, 1884.	Jan. 1, 1885.	Jan. 1, 1886.	Jan. 1, 1887.	Jan. 1, 1888.	Increase during 1887.
Number of lines	247	598	826	897	911	927	16
Miles of pole lines	6,154	20,592	25,766	30,697	31,143	32,478	1,335
Miles of wire	13,653	29,359	35,631	41,745	43,767	56,179	12,412

UNDERGROUND WIRES.

EXCHANGES.	Jan. 1, 1886. Miles.	Jan. 1, 1887. Miles.	Jan. 1, 1888. Miles.	Increase over 1887. Miles.
Albany	.....	1	1	.....
Boston	289	347	736	389
Brooklyn	134	1,233	1,443	210
Chicago	760	1,462	2,000	538
Detroit	.....	82	175	93
Louisville	.....	9	238	229
Milwaukee	1	1	.....	Loss 1
New York	627	627	1,120	493
Pittsburgh	614	966	958	Loss 8
Washington	992	1,302	1,338	36
	3,417	6,030	8,009	1,979
American Telephone and Telegraph Company's long-distance wires	.....	.....	140	140
	.....	.....	8,149	2,119

INSTRUMENTS.

	Dec. 20, 1882.	Dec. 20, 1883.	Dec. 20, 1884.	Dec. 20, 1885.	Dec. 20, 1886.	Dec. 20, 1887.	Increase during the year.
In the hands of Licensees, under rental	237,728	298,580	325,574	330,040	353,518	380,277	26,759

EXCHANGE CONNECTIONS.

The estimated number of exchange connections daily in the United States is	1,011,517
Or a total per year of	369,203,705
The number of daily calls per subscriber varies in different exchanges from 2 to 14, the average throughout the United States being	6 37–100
As compared with	5 82–100
The number reported last year, an increase of	0 per cent.

The average cost to the subscriber varies according to the size of the exchange and character of the service, from 2 to 8 cents per connection.

EXTRA-TERRITORIAL CONNECTIONS.

The average daily number of Extra-Territorial connections is	6,796
Or a total per year of	2,480,540
The Extra-Territorial earnings for the year amounted to	$565,718 46
Of which this company's share is	76,076 36
An increase over 1886 of	459 06

In the case of five companies which have not reported December earnings, the amount is computed at the average of the previous eleven months.

The Treasurers's statement shows:

Gross earnings from all sources		$3,453,027 70
Expenses		1,242,430 89
Net earnings		$2,210,596 81
Miscellaneous credits		27,011 31
Total		$2,237,608 12
Regular dividends paid	$1,176,252 00	
Extra dividend paid	392,084 00	
Total dividends	$1,568,336 00	
Reserve for depreciation of instruments	132,616 38	$1,700,952 38
Balance to surplus account		$536,655 74
Surplus account Dec. 31, 1886		1,491,380 18
Total surplus		$2,028,035 92

The case against the American Cushman Company is now ready for final hearing, and the directors have every reason to expect a favorable result.

In the cases before the United States Supreme Court on appeal (Dolbear case, Drawbaugh case, Molecular, Clay and Overland cases, which, it will be remembered, were argued the latter part of January and first of February, last year) a decision was rendered on the 19th March current. The opinion was by Waite, Chief Justice. All the cases on all points are determined in favor of the company.

The scope of the patent for which we have contended was sustained by the court. Mr. Justice Bradley, in behalf of himself and Justices Field and Harlan, expressed an oral dissent on the question of fact concerning Drawbaugh's priority of invention. Otherwise the opinion of the court expresses the unanimous opinion of all the members of it.

Bills for the regulation of telephone rates have been again introduced in a number of State Legislatures, but the result of the Indiana legislation has been so unsatisfactory to the subscribers, and the inexpediency of so crippling the companies that they would not be able to give the best possible service is so obvious, that we may hope that no such measures will be adopted.

The committee appointed by the Legislature of the State of New York to investigate telephone charges has reported a bill limiting rates for combination line service in cities of over 1,000,000 inhabitants, but the report of the committee itself furnishes the best arguments against the passage of such a bill, recognizing, as it does, the great cost of underground work, and the frequent changes in switchboards, cables, etc., made necessary by the rapid strides in electrical inventions.

The long-line service has been extended from New York to Albany, and to Boston, making a total of 550 miles of pole lines and about 10,000 miles of wire.

The success electrically, as well as commercially, has been beyond our expectations.

The income from the long lines is now more than sufficient to meet the current expenses, and there is every reason to expect that before next year it will pay a moderate profit. The great cost of the plant is to be borne in mind in considering the direct profit from the long-line service, but the importance of the system as a safeguard to our business cannot be overestimated.

It is intended to complete this year the lines between New York and Boston, to extend from Albany towards Buffalo, and to build a line from Chicago to Milwaukee. The estimated cost is about $1,000,000.

The Patent division has continued its work of collecting, digesting and studying information upon electrical matters, and preparing reports upon questions submitted to it by officers of the company.

It has also during the year considered and passed upon specifications for inventions for which the Western Electric Company intend applying for patents.

The electrical division has been mainly occupied in investigation for the accumulation of technical information for the use of our counsel. It has also begun, and is now pursuing, a series of experiments on multiplex telephony and on simultaneous telephony and telegraphy.

The mechanical department has experimented with a large number of instruments sent to it for examination, and it has also given much time to experimentation with a view to the improvement of our standard instruments, and to the solution of the problems which have been brought out by the long-line service.

Considerable time has also been spent in the study of magneto transmitters and in devising different forms for local uses.

LEDGER BALANCES, DEC. 31, 1887.

DEBTORS.

Telephones	$663,081 93	
Stocks and Notes	23,233,975 03	
Merchandise and Machinery	8,730 11	
Bills and Accounts Receivable	640,615 48	
Cash and Deposits	59,211 25	

CREDITORS.

Capital Stock		$9,802,100 00
Bills and Accounts Payable*		470,402 71
Patent Account (Profit and Loss)		8,554,752 18
Profit and Loss		3,365,018 63
Reserves		385,304 36
Surplus		2,028,035 92
	$24,605,613 80	$24,605,613 80

*Of this amount, $294,063 is the dividend payable Jan. 14, 1888, to stockholders of record Dec. 31, 1887.

BOSTON, March 27, 1888. WM. R. DRIVER, *Treasurer.*

COMPARATIVE STATEMENT OF EARNINGS AND EXPENSES.

EARNINGS.

	1886.	1887.
Rental of Telephones	$2,109,492 44	$2,264,823 94
Dividends	844,555 76	1,013,036 99
Extra-territorial and Branch Lines	78,109 81	80,443 67
Telegraph Commission	16,681 22	19,962 31
Interest	34,560 77	70,235 68
Miscellaneous	13,600 91	4,525 11
	$3,097,000 91	$3,453,027 70

EXPENSES.

Expenses of Operation	$230,968 05	$242,205 06
Legal Expenses	210,550 20	207,679 95
Interest and Taxes	82,458 25	139,174 80
Commission	404,111 30	433,578 37
Royalty	14,501 36	11,000 00
Rental Concessions	207,128 63	189,765 38
Miscellaneous		19,027 33
	$1,149,717 79	$1,242,430 89
Net Earnings	$1,947,283 12	$2,210,596 81
Miscellaneous Items to Surplus Account	26,067 64	27,011 31
	$1,973,350 76	$2,237,608 12
Surplus Account, Dec. 31, 1886	$1,491,380 18	
Net Earnings, 1887	2,210,596 81	
Miscellaneous Items	27,011 31	$3,728,988 30
Regular Dividends in 1887	$1,176,252 00	
Extra Dividend in 1887	392,084 00	
Reserve for Depreciation of Instruments	132,616 38	1,700,952 38
Surplus Account, Dec. 31, 1887		$2,028,035 92

On the first of September the company suffered a serious loss in the resignation of the president, Mr. Forbes. At a subsequent meeting of the board of directors the following resolutions, reported by Messrs. G. G. Hubbard, Cochrane and Sanders, a committee of the directors, were unanimously adopted, and ordered to be presented to the stockholders:

"*Whereas*, Our associate, Mr. Forbes, was chosen president of the National Bell Telephone Company at its organization on the 11th of March, 1879, and continued in that office until the merging of that company into this, the American Bell Telephone Company, and has been the president of this company since its organization in April, 1880, to the date of his resignation in September, 1887; and

"*Whereas*, During this long service the telephone business has grown in a most remarkable manner, the net income having increased from less than $2,000 per annum to about $2,200,000, and the number of instruments in use from about 21,000 to 375,000; and

"*Whereas*, The vast and unparalled litigation which this company has been forced to undertake, and the many and various interests occasioned by the system of licensing persons and corporations in every part of the country, and the intricate relations with the Western Union Telegraph Company and others have demanded qualities of an unusual character; and

"*Whereas*, Mr. Forbes has given constant attention to the interests of this company, and has displayed eminent ability, great dignity, uniform fairness, courtesy, and great tact in grasping the main points of the questions that have come before him, and has thereby won the confidence of his associates, of the licensees of this company, and of those with whom he has been brought officially in contact; and

"*Whereas*, Mr. Forbes, by these qualities, as well as by the marked moral courage and pluck exhibited on several trying occasions, and by his excellent judgment, has largely contributed to the success of this company;

"*Therefore resolved*, That the thanks of the directors be and they hereby are given to Mr. Forbes; and that this preamble and resolution be recorded in full in the minutes of the board, and a copy be presented to the stockholders at the annual meeting of this company.

"GARDINER G. HUBBARD,
ALEXANDER COCHRANE,
THOMAS SANDERS,
FRANCIS BLAKE,
GEO. L. BRADLEY,
CHARLES P. BOWDITCH,
CHANNING CLAPP,
CHAS. EUSTIS HUBBARD,
JOHN E. HUDSON,
CHARLES E. PERKINS,
H. STOCKTON."

The books of the company have been examined four times during the year, and the reports of the auditing committee are appended.

For the Directors,
HOWARD STOCKTON,
President.

A Pointer for Telephone Infringers.

The Supreme Court has just awarded R. A. Tilghman, of Philadelphia, $320,000 damages for the infringement of his glycerine patent, deciding that an infringer who defies a patentee cannot, after legal defeat, escape by paying merely the license fees which a licensee has paid. The license fees would have amounted, without interest, to $35,000; but the court awarded nearly ten times that amount as damages on the ground that an infringer is liable to account for all the savings and benefits derived from the wrongful use of the patent.

Tests of Electrical Welding.

Prof. A. E. Dolbear writes: "I have had made nearly a hundred tests of the tensile strength of electrically-welded bars of iron, steel and other metals. The results were of such a character that I can state positively that with Thomson's welding process it is possible to weld both wrought iron and steel so that the weld is as strong as the same cross-section in another part of the bar, that the appearance of the fracture is fibrous for iron and generally granular for steel, the strength of this granular steel being on some samples as high as 125,000 pounds per square inch; that the process is such that the welding is homogeneous from necessity.

"I had a number of bars welded by an expert blacksmith, and a number of similar ones by the electrical process for comparison, with the result that the electrically welded bars were much stronger than those welded by the ordinary process. The bars were of various sizes, up to an inch and a half for iron and three-fourths of an inch octagon steel."

Telephonic News

*** The Pan-electric backers in St. Louis are asking for a "compromise." They do not want to see the Pan instruments forming fuel for a funeral pyre.

*** Mr. C. D. Crandall, of Kansas City, Missouri, spent several days last week in New York. Mr. Crandall is secretary and treasurer of the Missouri and Kansas Telephone Company.

*** There are usually 100 direct telegraph wires and 16 telephone wires between Boston and New York. 62 of the telegraph wires belong to the Western Union Company, and all the telephone wires to the American Telephone and Telegraph Company.

*** At a meeting of the directors of the New England Telephone and Telegraph Company held last week, a dividend of 75 cents per share was declared, payable on Tuesday, May 15, 1888, to stockholders of record at the close of business on Friday, April 6, 1888. The transfer book will be closed from April 7, 1888, to May 7, 1888 both days included.

*** At the annual meeting of the stockholders of the American Bell Telephone Company held last week, about 150 were were present. Howard Stockton, president of the company, occupied the chair. These officers were elected: Clerk, Chas. E. Hubbard; treasurer, William R. Driver; directors, Francis Blake, Chas. P. Bowditch, Geo. L. Bradley, Channing Clapp, Alex. Cochrane, Wm. H. Forbes, Chas. Eustis Hubbard, Gardiner G. Hubbard, John E. Hudson, Chas. E. Perkins, Thos. Sanders and Howard Stockton. Mr. Stockton was re-elected president, and Mr. John E. Hudson general manager.

Mr. Foo Lee's Experience With an Unenlightened Telephone.

It may not be generally known that the firm of Foo Lee, Ah Sin & Wah Sing are the fashionable tailors of Mott street. Their business is quite extensive, and during the blizzard orders poured in from their countrymen for the comfortable quilted coats which help to make the Chinamen picturesque additions to New York street scenes. The orders came in so fast that the firm despaired of filling them. After consultation they decided to buy a sewing machine, for with it they could make three times as many fashionable Mott street tunics as by hand. The sewing machine offices being all up town, the problem was to order the machine without wasting time.

Foo Lee is enlightened and progressive beyond the average of his race. He thought of the telephone and rushed to a convenien down town station to speak with the sewing machine man. He rang the bell in the approved fashion, waited for the answering ring, and then said:

"Hello! You gottee shone 'achine, fi' dolla mont, makee shirtee on?"

Office—Yes. We'll sell you one on installments of $5 a month, and you can make shirts or anything you like on it.

Foo Lee—Allee yitee. You blingee sheen, me takee allee samee. Fi' dolla mont makee shirtee on. You sabee.

Just then the wire got crossed, and the message of an Italian fruit merchant on Third avenue came to the ear of the astonished Foo Lee, who heard:

"Goota banana. Nisa fruita. I bring you twoa bunch. You wanta wuna bag peanutta?"

Foo Lee—Chessenut! You heap fool. Hellephone no good. Me walkee down shone 'achine office. Me lub shone 'achine office down with hottee flat ilon.

Then he walked out of the telephone station with a frown on his usually bland countenance. He never appeared at the sewing machine office, and the gilded youth of Mott street are still wearing hand-made tunics.

Mr. Frank Ridlon has sold several Baxter Motors the past week for printing presses, etc., and receives very favorable reports from Providence customers.

Mr. S. S. Wheeler has resigned the position of electrician and superintendent of the C. & C. Motor Company. His office will be hereafter at 140 Nassau street. Mr. Wheeler is an energetic and capable electrician.

The Union Street Railway Company, of South Framingham, Mass., are asking for the privilege to use electricity as a motive power. A committee of the selectmen has been appointed to investigate the question.

The Carbondale (Pa.) and Electric Street Railway gave an exhibition of the dynamos on machinery in the power station, last Wednesday, March 28. The Sprague system is used. The REVIEW acknowledges a courteous invitation.

Mr. C. W. Jenks is in charge of the department of mills, mine and water powers for the Sprague Electric Railway and Motor Company, with headquarters at 46 Broad street, New York. This department is developing very rapidly.

The Riverside motor line of Wichita has contracted with the Sprague Motor Company for two miles of street railway, at $10,000 a mile. If satisfactory, the road will be extended three miles during the next two years, making five miles in all.

Negotiations are in progress with the parties who have put up the roller process, electric motor flouring mill at Laramie City, W. T., for the erection of a similar mill at Lander. The Laramie mill is the first flouring mill ever run by electricity.

The Brush Company, Cleveland, Ohio, has recently received a large order amounting to some $40,000, for an electric motor plant for use in some large silver mines in the Rocky Mountains. The value of the electric motor for mining purposes is becoming rapidly known.

The C. & C. Motor Company, 90 South Fifth avenue, city, is manufacturing a new fan motor, and judging from the large orders already received for this summer's business, will have an unusually heavy trade. The company is manufacturing on a large scale, and will soon commence delivering.

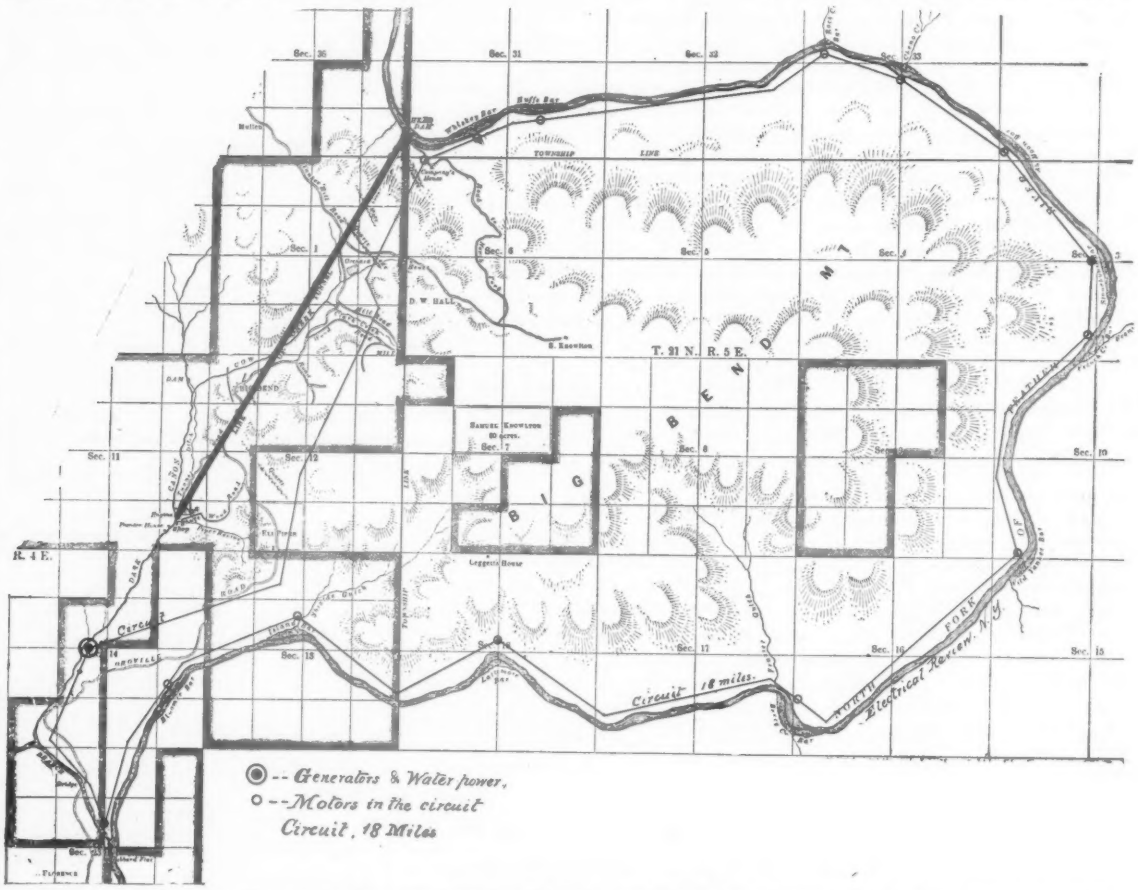
The electric power station on Foster street, Worcester, Mass., is furnishing nineteen concerns with electric power, about thirty horsepower per day. They are also experimenting with a carburated air engine which they have nearly perfected for furnishing power for small boats, bicycles, etc. This engine is furnished with power by the combustion of carburated air in place of gas, petroleum or other common fuels. It is a small machine, but gives sufficient power for the purposes designated.

The electric street car, equipped with the motor of the Weston Electric Company, popularly known as the Hewins Car, has been in the shop for the past fortnight, but Tuesday afternoon it made a trial trip in Cambridge, Mass. While in the shop it has been mounted upon four of the Swinerton polygonal wheels. The track was, for most of the way, covered with mud and water, but the car travelled well, at times speeding at the rate of 10 or 12 miles an hour. In climbing Dana Hill, the car went slowly, though there was power to have carried a much heavier load. President Whitney expressed himself as very much pleased at the manner in which the car did its work, and it is probable that an early opportunity will be afforded for giving it a thorough test in doing a full day's work, such as is usually required of a horse car.

An Extensive Application of the Electrical Transmission of Power.

Probably the largest undertaking yet attempted in the way of transmitting power electrically is that now in preparation by the Sprague Electric Railway and Motor Company for the Big Bend Tunnel and Mining Company, on whose property in California the plant is to be installed.

The Mining Company owns some 15 miles of the bed of Feather River, in Butte county, California, the river describing a horseshoe around Big Bend Mountain for a distance of about 14 miles. The streams which supply the river have for ages carried down from the neighboring mountains rich deposits from the auriferous strata, and the bed of the river has become a veritable storehouse of gold. The river is situated in a narrow cañon, and cannot by ordinary means be turned from its bed to make the deposits accessible. The Mining Company have, therefore, constructed a tunnel, 2½ miles long, through the mountain across the horseshoe, and with this tunnel and a dam in the river at the beginning of the bend they divert the entire volume of water, and leave the 14 mile bend dry, except the still water pools here and there, and along this bend operations will be carried on at the surface. The generating dynamos will be located below the exit from the tunnel, and will be operated by water wheels under a head of over 300 feet, and the current will be supplied to electric motors stationed at 14 different points on a circuit extending clear around the bend of the river, the motors supplying power to various kinds of machinery to be used in pumping and hoisting, and any other class of apparatus that may be required. The general situation and the extent of the circuit will be clearly understood from the map which represents the mountain, the bend or the horseshoe, and the cut-off tunnel. The undertaking is one of great magnitude, and we understand the total power transmitted will be something far beyond anything hitherto attempted in this line. It is another illustration of the fitness of the electrical transmission of power for many different classes of work called for in the far west, and other places, where the use of steam power on the spot is out of the question or so expensive as to make its use prohibitive.



THE GREAT UNDERTAKING OF THE SPRAGUE ELECTRIC MOTOR COMPANY IN CALIFORNIA.—MAP OF COUNTRY INCLUDED IN THE ELECTRIC CIRCUIT.

The Haverhill *Daily Bulletin*, a leading local paper in that live city, is to be printed on presses run by a 7½ horse power electric motor, a recent installation of Mr. H. C. Spaulding, of the Thomson-Houston Company.

Friendly Rivalry.

In a town not far distant from Boston is situated an abbatoir upon which there is a steam whistle, which moans dismally, whenever an alarm of fire is rung in, the number of moans telling the section in which the fire is located. Not far away lives the president of a local electric light company. The gentleman was unacquainted with the uses of the whistle and upon inquiring was informed that the noise was caused by an automatic attachment, owned by a rival electric light company, which upon the extinguishment of an arc light, immediately moaned out a number indicating the situation of the recreant lamp to the watchful attendant. Not many nights ago Boston had a boom in fires and consequently the whistle was sending forth its lonesome notes almost continuously. The following morning, our friend the president astonished his friends in the city with the remark, "we are beating those people all to pieces; they had lights out all night and their abominable whistle allowed me no sleep."

Electricity and the Lone Fisherman.

Now that everything is being done by electricity, it is not strange that the fisherman should utilize it. A small battery is attached to the rod, and near the hook is a small electric light. The fisherman lights up his lamp, and the unusual phenomenon attracts the fish. The baited hook does the rest.—*Exchange.*

Shade of Isaak Walton arise and sit on such deviltry. Where now will be the use of the reel whose whir was the song that gladdened the angler's heart? Think of the poor wanderer of the finny tribe with open mouth, paralyzed with astonishment and fear, taking the hook thus put into his mouth, and coming up limp and drooping without a struggle, to the click of a push-button on the rod-handle! Faugh! Where is the sport or relish in such fishing? As well go gunning for quail or snipe with a Gatling gun. William Black must put his foot on such sacrilege—he who knows so well how to depict the keen anticipation, the preparation, the cast, the strike, the music of the reel, the fierce excitement of the chase, and the final landing of a magnificent but conquered salmon. Let him stop this thing, or his vocation is gone.

H. M. Linnell, of Hartford, left for Buenos Ayres, S. A., to be gone two months. He represents an electrical and banking syndicate that has in view the opening of a big South American business.

Personal.

Mr. A. J. DeCamp, general manager of about all the arc lighting there is in Philadelphia, was a New York visitor last week.

S. Insull, the chief magnate of the Edison Machine Works, Schenectady, N. Y., was in the city last week. His works are exceedingly busy.

Gen. C. H. Barney returned last Saturday from a trip of several weeks through the northwest. He missed the blizzard, and, consequently, a good deal of fun while away.

Mr. Geo. Washington Davenport, of Boston, one of the several bright and energetic young men that are now connected with that progressive electric light company, the Thomson-Houston, was a New York visitor last week.

Mr. John I. Sabin, of San Francisco, one of the most successful telephone managers of the country, is visiting New York, staying at the Electric Club. He is warmly welcomed by a host of friends he has in the East, all of whom are glad to see that his arduous duties do not change him from the cheery and active telephone man as of old.

Mr. J. H. Reid, the western manager of the Mather Electric Company, with headquarters at Chicago, has been at Coronado, Cal., for several weeks, looking after the installation of a large plant of his company in the Hotel de Coronado. When Mr. Reid saw the account of the great New York blizzard, he was greatly pleased to be in Coronado, where the sun was shining in all its brilliancy, flowers blooming in abundance, and people in the surf bathing. The eastern friends of Mr. Reid who froze their capacious ears in the blizzard will be disposed to envy him.

—— There are 181 electric lamps in use by the City of Mobile, Ala. The present contract was entered into on the 18th of June, 1887, and continues for a period of five years from the date of its execution. The lighting of the streets under this contract will cost during the year, $17,970.

—— The following are some of the recent Thomson-Houston installations or additions to established plants: Portlandt, N. Y.; Lima, Ohio, and East Greenwich, R. I., each have new 500 light alternating machines; Malone, N. Y., the same and also an increase of 30 arc lights; Clevure, Texas, has 35 new arc lights. Morristown, Tenn., has increased to plant by 30 arc lights. The Chicago City Railway Co., has a new plant of 200 incandescent lights, and Ashland, Wisconsin, a new 50 arc light plant.

An Electric Light Exchange in Boston.

The Boston Electric Club rooms were well filled one day last week in response to an invitation sent out by Messrs. H. B. Cram, Frank Ridlon, W. B. Hosmer and P. H. Alexander, of the various electric light companies, asking those receiving it to assemble and talk over equitable means for harmonizing the object of insurance inspection, and the effective installation of electric light plants desired by the different electric light companies. Among those present were Prof. Thomson of the Thomson-Houston Company, Mr. W. J. Jenks of the New York Edison Company, Captain Brophy and S. E. Barton of the New England Insurance Exchange, Professors Cross and Holmon of Technology, and others. The meeting was called to order shortly before three o'clock, and President Alexander was made chairman, with A. V. Garratt, editor of *Modern Light and Heat*, and H. H. Eustis as secretaries. It was decided that the two schedules of rules issued respectively by the New England Insurance Exchange and the Boston Fire Underwriters' Union should be read section by section and discussed.

The discussion which ensued was taken part in by Captain Brophy, Mr. Wright of Springfield, S. E. Barton, Mr. Cabot, Mr. Frank Ridlon, and Mr. G. W. Davenport. It was decided to lay on the table that portion of the schedules bearing on arc lighting and discuss those bearing on incandescence. The one point which seemed to engross most attention was the method of making joints in electric wires. Mr. T. D. Lockwood of the Bell Telephone Company, spoke in the interest of telephone wires, and asked for their consideration at the hands of electric light and telegraph men, saying that the effect of these latters' wires was very injurious to the good service of the telephone. The subject of converters was also introduced, and, after some discussion, the general opinion was decidedly in favor of converters being placed outside of buildings.

An invitation having been brought to the meeting by Professor Cross to visit the electric laboratory of the Institute of Technology, and to witness the operation of the alternating system of electric lighting recently installed there, an adjournment was taken for this purpose.

The evening session was held at the Hotel Thorndike. The first part was devoted to a discussion of electric fuses and their application in the case of fires. Captain Brophy stated that many so-called fuses were fuses in name only. Other speakers on this subject were Mr. Garratt and Mr. Jenks. The latter told of somewhat elaborate experiments conducted by himself in the Edison laboratory to prove what the fuses now in use are really capable of accomplishing. The next point under discussion was the distance at which primary and secondary wires should be suspended, Messrs. Brophy, Barton and Woodward participating, the insurance men holding to twelve inches, while Mr. Woodward claimed eight inches as sufficient distance. After further discussion of some points of minor importance, it was decided that, for the mutual benefit both of those engaged in electrical pursuits and insurance, an organization should be forthwith formed. This suggestion was promptly acted upon by the appointment of a committee, composed of Dr. Robert Amory, Mr. Frank Ridlon and Mr. R. B. Tabor, to report upon the desirability of at once organizing.

A report was shortly afterward submitted, setting forth that an organization should be formed, to be called the New England Electric Exchange. Among the officials is to be a board of referees, which shall be the medium of communication between the members and the New England Insurance Exchange. The board is to report at a meeting to be held in April a plan under which license may be granted to employees of electric light stations, and to those engaged in the wiring and installation of electric light plants. The report was adopted, and the following officers elected: President, Mr. P. H. Alexander of the Sawyer-Man Company; secretary, Mr. H. B. Cram of the Bernstein Company; referees, Dr. Robert Amory, Mr. Frank Ridlon and Mr. G. W. Davenport. The meeting then adjourned.

Bids for New York City Lighting.

Mayor Hewitt, Commissioner of Public Works Gen. John Newton, and Comptroller Myers, composing the Gas Commission, last week opened the bids that had been presented for lighting the streets and public buildings with gas and electric lights. These were as follows:

Gas.—Consolidated and Mutual Gas Companies, $17.50 per light per annum; Equitable, $12; Central (Twenty-third Ward), $28; Northern (Twenty-fourth Ward), $29; Yonkers, $29; New York and New Jersey (Twenty-third and Twenty-fourth Wards), $21.50, $23.50 and $25.

Electric Lighting.—Brush Electric Light Company, 381 lamps at 44 cents per night and 52 lamps at 39 cents per night; United States, 19 lamps at 42 cents, 38 lamps at 44 cents, 13 lamps at 47 cents, and 339 lamps at 49 cents; Harlem, 207 lamps at 39 cents, 29 lamps at 40 cents, 38 lamps at 41 cents, 124 lamps at 42 cents, 12 lamps at 45 cents, 19 lamps at 50 cents, and 50 lamps at 60 cents; Mount Morris, 87 lamps at 32 cents, 143 lamps at 39 cents, and 80 lamps at 40 cents; East River, 162 lamps at 32 cents, 252 lamps at 59 cents, and 212 lamps at 42½ cents; Ball, 72 lamps at 50 cents, on Broadway and Sixth avenue, from Twenty-third to Fifty-ninth streets; North New York, 370 lamps at 39 cents. Each light is to be of 1,000 candle power. The North New York Electric Light Company further submitted the provisional bid to furnish any required number of incandescent lamps at 7 cents per night.

Mayor Hewitt asked why the East River Electric Light Company had failed to furnish the lights contracted for during the past year, and was informed that the Board of Electrical Control had refused the company the privilege of putting up the necessary poles for stringing its wires. The company would, during the week, demonstrate to the Superintendent of Lamps and Gas its ability to execute any contract it might hereafter enter into. No awards were made, but the bids were referred to Superintendent McCormick of the Bureau of Gas and Lamps to tabulate and report which were the lowest among them.

Electric Lighting in Japan and Corea.

In Japan most of the principal cities are now lighted by electricity, as ours are, and most of the finest houses are illuminated in the same way. A large Edison plant has recently been placed in the palace of the Mikado, at Tokio, a very large building, or rather a cluster of buildings, connected by corridors and covering several acres.

The Chinese do not take hold of these improvements as readily as the Japs, but are beginning to see their advantages.

The Coreans are ready to adopt all modern ideas, particularly if they come from the United States. The palace of the King of Corea has a plant of 300 lights, and was first illuminated on the birthday of the king's mother-in-law, on the twentieth of February, with great ceremony. The palace is at Seoul, and consists of a series of long, low wooden buildings, with a thatched roof.

As no foreigner is allowed to look upon the features of the king or queen, the workmen took great risks when they were putting in the apparatus, for if they had, even by accident, seen the face of the king, they would have been put to death, according to the custom of the country. They were carried into the palace and through the corridors in palanquins, and trumpeters were sent ahead of them, so that the royal family might keep out of their way.

Boiler Infringement.

The United States Circuit Court for the district of New York, Judge Wheeler, has given a decision in favor of The Babcock & Wilcox Co. against the Pioneer Iron Works, for infringement of their patent, in building the "Zell" boilers, and we understand that the latter company have paid $6,500 in settlement for such infringement.

A similar suit against the makers of the Moore boiler is now pending in the United States Circuit Court for the district of New Jersey.

—— The Omaha, Nebraska, school board intends to put an incandescent electric light plant in the night school building for the purpose of lighting the building and grounds, and to fully illustrate the teaching of electricity.

Electricity Pleases the Editor,

Says the Rochester *Morning Herald* editorially:

The great advantages of the incandescent system over all others has been experienced for a long time in the *Morning Herald* establishment, which is completely equipped with it, and has not a gas jet in it. The benefits are especially noticeable in the composing room, where numerous burners are necessary. The difference between the air of this apartment as it was when gas was used and what it is with the incandescent lights is apparent to every one who has had an opportunity to make the comparison, and the change, particularly in the long nights of the winter months when the windows and doors are kept closed, must be of the greatest advantage to the health of the occupants.

Among other considerations in favor of the incandescent light are its safety and its convenience. It is impossible for it to communicate fire, and as no matches are used there is no danger from that source.

Electric Lighting in Portland, Me.

At the expiration of the contract between the City of Portland and the Consolidated Electric Company, it was again renewed upon equally favorable terms. More arc lights are employed this year than formerly, in pursuance of the plan of substituting an arc light for several incandescent lamps, wherever it can be done to advantage. Complaint having arisen of lamps being extinguished a portion of the night, the police were instructed to report any failure in this respect and its duration. Their reports have been summarized from month to month, and the loss to the city computed in dollars and cents. The aggregate amount has been found to be inconsiderable, much less than the annoyance resulting from the interruption of light would have indicated.

Excepting these occasional interruptions, which, on the whole, may be almost unavoidable, the citizens express themselves extremely gratified with the method of arc lighting, under which the principal streets, squares and wharves are illuminated to a degree rendering them perfectly safe for travel at all hours of the night, to say nothing of the additional security everywhere furnished to property.

—— The United States Electric Lighting Company's western agent, Mr. C. C. Warren, has just issued a book of western testimonials (largely *fac-similes*) of forty-eight pages, which is neat in the extreme. From an artistic standpoint, the illustrated covers are attractive and ingenious. The first page of these shows the progress of lighting, the primeval jack torch of light wood, the candle in a monk's cloister, and the arc and incandescent lamp, for in and out door use. The "seven ages of illumination" are pictured on the last outside. One of these, "the light of other days," depicts the danger there is in too close proximity between newspaper and candles in a sleepy reader's hands, and a bit of local history is made to do duty in a representation of Mrs. O'Leary's illuminating scheme in 1871, which, it will be remembered, was quite thorough, but extremely expensive. The Chicago business address of the U. S. Co. will be "The Rookery," corner of La Salle and Adams, after May 1st.

—— The John T. Noye Manufacturing Company, of Buffalo, are furnishing and erecting the entire steam power plant for the United States Electric Light and Power Company of Buffalo. The engine is a 300 horse-power double compound condensing engine of the Rice automatic pattern, arranged so that in case of accident either engine can be operated with live steam and the other disconnected. The same company have been given the order for one 300 horse-power and two 100 horse-power pairs of Rice compound condensing engines for the Thomson-Houston Electric Light and Power Company of Buffalo, and two single Rice automatic engines of 160 horse-power each for the Thomson-Houston Electric Light Company of North New York.

—— The electric lighting of churches is making some progress in the Eastern and Middle States. Trinity Church, at Newburgh, N. Y., has a Thomson-Houston plant that is giving great satisfaction.

ELECTRIC LIGHT NEWS

—— Osage, Mass., is to have the electric light.

—— The Edison Company is installing a plant in Winchester, Tenn.

—— Two Brush arc and incandescent plants have recently been sold in Oil City, Pa.

—— The Sandusky Electric Light, Fuel, Gas and Supply Co. has increased its capital from $20,000 to $30,000.

—— The Frankford Electric Light Company, Philadelphia, Pa., has been authorized to substitute wooden for iron poles.

—— The City of Poughkeepsie, N. Y., has contracted for city lighting for $23,000 for the year. 187 street lamps are used.

—— The new Brush incandescent plant recently purchased by Bundy, Thompkins & Fassett, of Elmira, N. Y., is just completed.

—— The Edison United Manufacturing Company, 65 Fifth avenue, has just issued a price list of all kinds of Edison electric lamps.

—— The Hartford L. & P. Co. are reported to have adopted the Waterhouse system in that city for electric lighting with arc lamps.

—— The Denton, Tex., Water and Electric Light Company has just been organized, with a view of supplying the city with water and light.

—— The Brush Electric Company have recently shipped to the City of Mexico four large 65 arc light dynamos with from 200 to 300 arc lamps.

—— The new electric light plant recently purchased by the City of Carlinville, Ill., is just completed. Brush arc and incandescent lamps are used.

—— Frederick, Md., is arranging for the use of electricity instead of gas. The Thomson-Houston system is being tried—which usually means adoption.

—— The Ball Electric Light Company is to be established in Fall River, Mass. The new system will be for merchants especially, and for arc lights in front of stores.

—— The Edison Company is asking for more underground conduit privileges in Philadelphia. There is quite a demand for the incandescent light in that city.

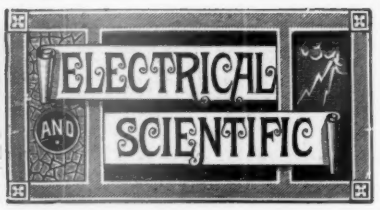
—— The Northampton (Mass.) Electric Lighting Company will soon put in another 400-light incandescent dynamo, and introduce the three-wire system upon Main street.

—— The Virginia Beach Hotel Company, of Virginia Beach, Va., have recently purchased a large Brush arc and incandescent plant for their hotel, which has just been enlarged.

—— Stock has already been subscribed for another electric light plant in Gadsden, Ala. As soon as the necessary papers are signed the plant will be in full operation. To say that it is in the hands of Major William Sandford bespeaks for its great success.

—— The city authorities of Charleston, Ill., have just closed a contract with the Brush Electric Light Company for illuminating that place. Inasmuch as the town has been almost in darkness for years past, the people are jubilant over the arrangement.

—— The Rutland, Vt., Electric Light Company has continued to light the streets during the year, and its monthly bills have been paid at the rate established the previous year, although not possessing a regular contract. The number of lights in use is the same as last year, eight arc lights running all night and every night in the year, and 47 arc lights running until midnight 250 nights in the year.



* * At Halltown, West Virginia, Eyster & Son contemplate improving their paper mill, and putting in electric light machinery.

* * The "Mary Powell," said to be the fastest steamboat (side-wheeled) in the world, is being fitted up with the United States incandescent system.

* * The presence of eighty-three students in electrical engineering at Cornell University is an indication of the rapid growth of the interest in the application of electricity to engineering problems.

* * Mexico is a country where the telegraph linemen go in couples, and armed with rifles to fight off the fierce "puma," or Mexican tiger (tigre), who assaults man, and is especially ravenous for telegraph constructors. The Mexican linemen down in the hot coast country shoot many a puma while out attending to their lines.

* * An electric gas lighter and extinguisher has been patented by Mr. George L. Hogan, of Olmstead, Ky. The burner is provided with a poppet valve operated by a shaft and eccentric receiving rotary motion from the armature of an electro-magnet, with other novel features, the device being adapted for lighting a single lamp or a series of lamps at the same instant, and for street or office lighting.

* * Two fine steamers are in course of completion at the yards of Messrs. J. and G. Thomson, Clydebank, for the Inman and International lines. These vessels, the "City of New York" and "City of Paris," are supposed to be finer in every way than any which have preceded them, and the fittings and decorations are on a gorgeous scale. The ships throughout are lighted by electricity, more than a thousand incandescent lamps being provided in each case. There are two engines, so that should one break down the other is available to prevent darkness in any emergency.

The Waterhouse Regulator.

A representative of the REVIEW the other day witnessed a most interesting test of this very decided novelty. The regulation is entirely electric, not depending upon any magnets, solenoids, brush-shifters or other movable devices whatever. The brushes are stationary, and to the casual eye the regulation is a mystery. The machine is series wound. The test was made on a 35-light dynamo, the lamps consuming each $9\frac{1}{4}$ amperes, with 45 volts fall of potential. An accurate ammeter was placed in the lamp circuit and another in the field circuit. The test was made repeatedly by both cutting out and introducing lamps, and the following readings taken :

	CURRENT IN LINE.	CURRENT IN FIELD.
35 lamps (normal arc).....	9.25 amp.	9.20 amp.
20 " " "	9.25 "	4.75 "
15 " " "	9.25 "	4.00 "
10 " " "	9.25 "	2.75 "
5 " " "	9.25 "	2.00 "
1 " " "	9.25 "	1.25 "

At the instant of change of lamp-load there was no sudden overthrow of the instrument readings ; the needle quietly moved to its new position, and remained till the next change of lamp-load was made. The operation was striking indeed, as we are accustomed to look for more or less momentary oscillation of the current at the instant of cutting in or out any considerable number of lights. We are not at liberty to go into the details of this system of regulation for constant current ; but the figures given above are reliable, and point to a high efficiency of the machine, and one whose percentage shows very nearly constant throughout the entire range of electro-motive force of the dynamo.

OUR KANSAS CITY LETTER.

(Special Correspondence.)

The Missouri & Kansas Telephone Company is on the constant jump, and not only is the service locally being extended and improved, but it is the same throughout the two states in which the company operates. The patronage of the company, locally, has been grossly represented lately in rural "boom" towns anxious to make a mean fling at Kansas City and to depress, if possible, the irrepressible rise in the value of its real estate and other properties. The journals of these villages have announced in elaborate manner that the telephone business was falling off in Kansas City at a most remarkable rate, that 200 telephones a day were ordered out. It needed no authoritative denial. The statement bore the imprint of falsehood on its face. Besides, any visitor in Kansas City can see the men on the poles putting in the new lines, and can count the names in the telephone directory. More prosperous than ever is the word sent out from headquarters.

Electrical enterprises and construction is still in the heat of activity throughout the West and Southwest. The benefits and beauties of electricity are becoming more and more appreciated in the West, and, if not now, the time is not far distant when it can be said truthfully that the West has adopted electricity more completely and is more its home than the East. Its untiring industry, its silent power, its quickness, and its simplicity are the qualities that appeal most strongly to the western man, and he welcomes it with wide open and extended arms. All the construction and supply companies report themselves as far behind their orders. They are happy in being able to say this too, for it has been won (the ability and right to say it, I mean) in a hand-to-hand fight with the representatives of St. Louis, Chicago, Indianapolis and more eastern companies. But the Kansas City men are hustlers and no mistake. They say the demand for electrical apparatus in the West seems wonderful even to them. Almost before a village has a population of 500 it begins to agitate electric lighting. When it has 1,000 it wants a telephone system and wants to be connected by direct wire with every metropolis in the country. When 5,000 are collected there life becomes almost unendurable without experimentation with electric motors and railways. But the boys encourage these feelings and there is mutual profit in the end.

The Kansas City Heat, Power and Light Company proposes to do all the heating, elevator running, electric lighting, cooking, machine operating, press running, etc., including the operation of street railways, that is done in Kansas City, Mo. This, the company says, it will do through the operation of machines and appliances invented and patented by Eugene F. Osborne, the chief engineer of the company. A plant costing about $300,000 will be established. Here, steam, the great power of the company, will be manufactured. This will be conveyed throughout the city by huge mains. This steam will enter the engine of the patron and the wheels will begin to revolve. The scheme is especially interesting to electric light men, inasmuch as the company says it can furnish electric light cheaper than the established companies. The company proposes to establish powerful dynamos here and there throughout the city. Its steam will operate them. Thus each business block, and each block of business houses can, if so desired, have its own little system of electric light. The company claims this will be cheaper and better than for the whole city to be supplied from one plant, as is the case now. The Kansas City Electric Light Company is inclined to view the project somewhat disdainfully, and hoots at the suggestion that this steam company can furnish electric light cheaper and better or even as cheap and good as it can.

Electricity is about to absorb and overwhelm Kansas City's big and unweildy Kansas suburb, Wyandotte, or as it is more recently known, Kansas City, Kan. Applications are now pending before the council for four franchises, in which electricity is the main thing in three, and probably will be in the fourth in time. These applications are as follows : By Ben Freidburg, for a franchise to operate electric light works ; by William Fletcher, for the same privilege ; by Sharp & Jenkins, for the operation of incandescent electric light works ; by William Edgerly and others, for the operation of a street railway in which steam cables or electricity shall be the motive power.

MISSOURI STATE NOTES.

The Bell Telephone Company of St. Joseph, Mo., has locked horns with the Union Street Railway Company and the city. The Union Street Railway is putting in an electric street railway, using the Sprague motors. The company desires to run its return wire underground. The telephone company says that whenever this has been done, and St. Joseph will be no exception, there has been interference with the telephone system, and in the business portions the system has been nearly wrecked. The telephone company thought the street railway company should give them an indemnifying bond against possible damage. W. S. Elliott, the Topeka representative of the Sprague company, was called in, and ridiculed the idea of interference and of a bond. The city is standing by the street railway company, but is nevertheless conducting experiments to ascertain whether there really is any interference.

The St. Joseph Lead Company will establish a railroad and telegraph line between Bonne Terre and Doe Run.

The county commissioners of Buchanan county have decided to place an incandescent electric light plant in the court house in St. Joseph, and has asked for sealed proposals, to be opened May 14.

The telephone line between Dexter and Bloomfield has just been completed and is now in full operation. The line was principally built by George Houck, of Bloomfield, and is owned by him.

There are still some very backwoods towns in Missouri, as the following item will indicate: The city council of Washington has ordered 100 coal oil lamps for street lighting purposes.

KANSAS STATE NOTES.

A Hutchinson correspondent of a Kansas City paper contains the following joke : The Hutchinson Telephone Company is not in the least discouraged by the recent decision in favor of the Bell Company, but proposes to continue the fight. The Hutchinson Company has evidence to prove that the Cushman patent existed twenty-five years before the Bell telephone was made, the Cushman patent being the one in use in Hutchinson. They will not set up the 1,000 years' use of the telephone in India. They do not consider it necessary. If the Bell monopoly can be broken the Hutchinson crowd can do it.

During the summer of 1887 the Leavenworth Telephone Company expended about $7,000 in rebuilding and putting up copper wire in cables instead of iron wire and stringing naked copper wire instead of iron wire. In March, 1885, there were nine calls per day to every subscriber. In March, 1886, thirteen calls per day ; in March, 1887, eleven calls ; in March, 1888, nine calls to each subscriber. During March, 1885, there was an average for three days of 9,465 calls ; 1886, 13,737 calls ; 1887, 12,441 calls ; March, 1888, 12,634 calls at the exchange, with a night average of about 300 calls from 8 P. M. to 7 A. M.

The Edison Electric Light Company, of Topeka, Kan., will probably extend their wires to Potwin this summer. The company is now operating its full capacity and running between 4,000 and 5,000 lights. During the coming season the company contemplates building an extensive addition to their present building, putting in a large amount of new machinery and enlarging the capacity of the plant at least 100 per cent.

The city council of Florence has granted a franchise to Elias Kapp, of Wichita, for the construction and establishment of a plant of the Jenny electric light system. Under the provisions of the franchise the work must commence within ten days, and the system to be in full operation on or before May 1.

Burton is mighty proud of its electric light system, and allows no one to talk or think disparagingly of it if it can help it. It is the storage battery system, and was put in by the Inter-state Electrical Company, of this city. Some of Burton's rivals have spoken sarcastically about it, and the little city decided to strike a blow once and for all, that would settle the tongue of the carping critic. Representatives of all the neighboring and rural towns and cities were invited to inspect the system and to take part in a banquet. They flocked to Burton in great numbers. They were driven over the city, shown every detail of the construction and operation of the system, by day and by night, their stomachs filled with good things, and then asked their opinions. They were unanimously in favor of Burton and her storage batteries. Ever since Mr. Paul Bossart, of this city, and Mr. W. F. Stocker, of Burton, the representatives of the Interstate Company, have been so exhilarated as to be regarded with slight suspicion.

The Electric Light Company, of Hiawatha, and the city council Monday evening closed their contract which is to run five years. The company pays the city $80 a month for power to run their dynamos and the city takes six arc lights at $10 a month each. The system used will be the arc system, and the rates are very much lower than the rates in any other cities where the same system is in vogue. The lights will be of 2,000 candle power. Churches will be given half rate. The plant will be completed on or about May 1st. Prof. White, an electrician of Lincoln, Neb., has taken the measurements and drawn the specifications. About twenty representatives of various companies have been here and have been figuring with the company. The president of the company is Geo. H. Adams, and C. H. Lawrence is the secretary.

The Atchison Electric Light Company will in a few weeks put in another incandescent plant, and make other very important improvements. G. M. P.

Kansas City, Mo., March 31.

That Embarrassing Telephone.

"I didn't come in on business," said a subscriber to the young lady at the central telephone office in a Pennsylvania town the other day, "I just wanted to tell you what trouble you made in a family at Smithville the other day."

"I !" said the young lady, terror-struck.

"Yes," laughed the subscriber, "you know the other day I asked you to call up Gibbons, and see if his brother Al was going to Pittsburgh that day. Well, John Gibbons was at the 'phone, and when he heard you say, 'Is Al going to Pittsburgh,' he turned to another man in the office and said, 'My goodness ! this is funny. Here's a lady who wants to know if Al is going to Pittsburgh.'

"'You don't say so,' said the gentleman ; 'let me listen.'

"So he stepped up to the 'phone and asked, 'What is it ?'

"You repeated the question, 'Is Al going to Pittsburgh ?'

"'No, he is not going,' he said to you.

"Then turning to Gibbons, 'Yes, indeed,' he said, 'so it is a lady. I wonder what she wants him for. I guess she wants to go along with him. My goodness ! if his wife knew it.'

"Well, it wasn't very long before his wife did know it. And it was an exceedingly short time after that when her husband knew she knew it, and of course there was trouble. O ! what a quarrel they did have," and the subscriber laughed joyously at the remembrance.

"I don't know how it would have ended if I hadn't gone around in the afternoon and heard about it, and told them that you were the operator, and were talking for me," and with another huge laugh, the subscriber left.

—— The Edwards Manufacturing Company, Augusta, will soon put in nine of the new Holmes water wheels at their electric light and power station on the east side These wheels represent 1,700 horse-power.

ELECTRICAL PATENTS

(Copies of any Patents in the following List will be sent to any address on receipt of twenty-five cents.)

INDEX OF INVENTIONS FOR WHICH LETTERS PATENT OF THE UNITED STATES WERE GRANTED IN THE WEEK ENDING MARCH 27, 1888.

379,944 Commutator for dynamo electric machines; Thomas A. Edison, Llewellyn Park, N. J.
379,956 Regulator for dynamo electric machines; Charles Heisler, St. Louis, Mo.
379,977 Electric gas burner; John Y. Parke, Philadelphia, Pa.
379,991 Submarine torpedo vessel; Charles D. Shepard, New York, N. Y.
380,010 Electric annunciator; Charles S. Young and Gwynne E. Painter, Baltimore, Md.
380,020 Electro dynamic machine; George F. Card, Covington, Ky., assignor to the George F. Card Mfg. Co., same place.
380,060 Electric railway; Francis M. Speed, San Francisco, Cal., assignor to the Telpherage Electric Railway Company, same place.
380,074 Arc lamp; Thomas E. Adams, Cleveland, Ohio.
380,084 380,085 Galvanic battery; Horatio J. Brewer, New York, N. Y.
380,100 Pyromagnetic motor.
380,101 380,102 System of electrical distribution; Thomas A. Edison, Llewellyn Park, N. J.
380,103 Conduit for electric railways; Stephen D. Field, Yonkers, N. Y.
380,114 Incandescent electric lamp holder and cut out. 380,115 Alternating current dynamo electric machine; Charles Heisler, St. Louis, Mo.
380,138 Induction coil; Elias E. Ries, Baltimore, Md.
380,144 Dynamo electric machinery; Frank J. Sprague, New York, N. Y., assignor to the Sprague Electric Railway and Motor Company, same place.
380,157 Electric conductor; Edward G. Acheson, Pittsburgh, Pa.
380,158 Manufacture of electric conductors; Edward G. Acheson and Benjamin F. Anderson, Pittsburgh, Pa.
380,165 Railway signal; Arthur W. Bennett and John M. Millen, Fontanelle, Iowa.
380,186 Fire signal and burglar alarm; James E. Church, Minneapolis, Minn.
380,202 Incandescent electric lamp holder and cut out; Charles Heisler, St. Louis, Mo.
380,215 Ear battery for the deaf; Mary E. Moore, New York, N. Y.
380,241 Fire and burglar alarm system; William A. Barnes, Bridgeport, Conn.
380,261 Electric vapor bath; Robert F. Jackson and William R. Pope, Baltimore, Md.
380,271 Electric arc lamps; Charles W. Adams, Chelsea, assignor of three-fourths to Arthur B. Browne and Edgar Harding, both of Cambridge, Mass.
380,294 Dynamometer; Charles F. Murdock, Detroit, Mich., assignor of one-half to Jonathan K. Webster, same place.
380,295 Insulated electrical conductor; William A. Phillips, Schenectady, N. Y., assignor to the Edison Machine Works, same place.
380,301 Electric light and globe protector; William M. Tompkins, Batavia, N. Y.

REISSUES.

10,915 Telephone transmitter; John H. Irwin, Morton, Pa.

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PATENTS.

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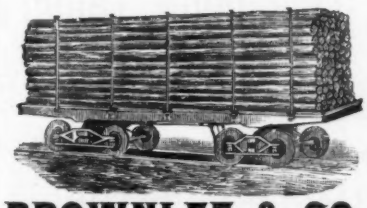

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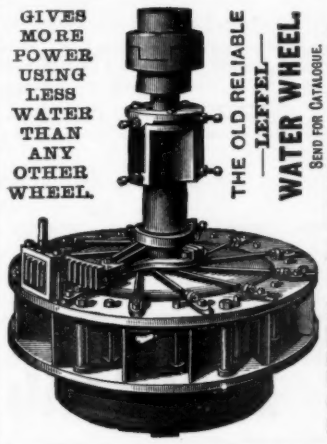
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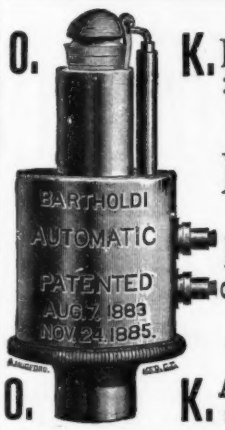

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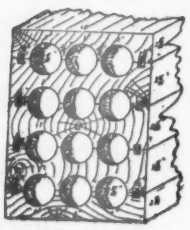

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